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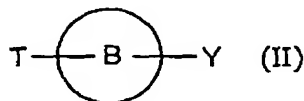
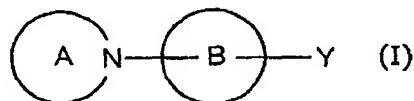
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81675 München (DE)**(54) **NITROGEN-CONTAINING HETEROCYCLIC COMPOUNDS AND MEDICINAL USE THEREOF**

(57) The compound represented by formulae (I) and (II), the salt thereof, the N-oxide thereof or the solvate thereof, or the prodrug thereof and the pharmaceutical composition comprising thereof have a CXCR4-regulating effect, and they are effective in treatment and prevention of various inflammatory disease, various allergic disease, acquired immunodeficiency syndrome infection with human immunodeficiency virus, or agents for regeneration therapy.



(wherein ring A represents a nitrogen-containing heterocyclic group which may have a substituent(s); ring B represents a homocyclic group which may have a substituent(s) or a heterocyclic group which may have a substituent(s); and Y represents a hydrocarbon group which may have a substituent(s), a heterocyclic group which may have a substituent(s), an amino group which may be protected, a hydroxyl group which may be protected or a mercapto group which may be protected; T represents ring A or an amino group which may be protected.)

EP 1 571 146 A1

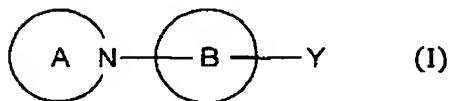
Description

Technical field

- 5 [0001] The present invention relates to CXCR4 regulators that are useful as medicament.
 [0002] More particularly, it relates to

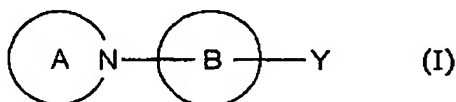
(1) compounds of formula (I)

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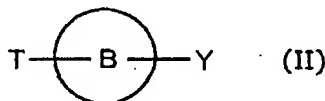
- 15 (wherein all the symbols have the same meanings as defined hereinafter), salts thereof, N-oxides thereof or solvates thereof, or prodrugs of the same,
 (2) pharmaceutical compositions comprising compounds of formula (I)

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- 25 (wherein all the symbols have the same meanings as defined hereinafter), salts thereof, N-oxides thereof or solvates thereof, or prodrugs of the same,
 (3) CXCR4 regulator comprising compounds of formula (II)

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- 35 (wherein all the symbols have the same meanings as defined hereinafter), salts thereof, N-oxides thereof or solvates thereof, or prodrugs of the same, as an active ingredient, and
 (4) methods for preparation thereof.

[0003] Chemokine is known as a basic protein having endogeneous leukocyte chemotactic and activating abilities and strong heparin-binding abilities. At present, it is considered that chemokine is related to not only the control of infiltration of specific leukocyte at the time of inflammations and immune responses but also the development and homing of lymphocyte under physiological conditions and migration of hemocyte precursor cells and somatic cells.

40 [0004] Differentiation, proliferation and cell death of hemocytes are controlled by various types of cytokine. In the living body, inflammations are found topically and differentiation, maturation and the like of lymphocytes are carried out at certain specified is, various necessary cells migrate into certain specified sites and accumulate therein to cause a series of inflammations and immune responses. Accordingly, migration of cells is also an indispensable phenomenon in addition to differentiation, proliferation and death of cells.

45 [0005] Migration of hemocytes in the living body starts firstly in the development stage by the shift of hematopoiesis started in the AGM region into permanent hematopoiesis in bone marrow via fetal liver. Furthermore, precursor cells of T cells and thymus dendritic cells migrate from the fetal liver into the bone marrow and then into the thymus gland and cytodifferentiate under thymus environment. The T cell which received clone selection migrates into secondary lymphoid tissues and takes part in an immune response in the periphery. The Langerhans' cell of the skin activated and differentiated by capturing an antigen migrates into the T cell region of a topical lymph node and activates naive T cell therein as a dendritic cell. The memory T cell performs its homing again into the lymph node via lymphatic and blood vessels. Also, B cell, T cell in the intestinal epithelium, $\gamma\delta$ T cell, NKT cell and dendritic cell migrate from bone marrow without passing through the thymus gland and differentiate to take part in an immune response.

50 [0006] Chemokines are deeply involved in these various cell migration. For example, an SDF-1 (stromal cell derived factor-1) and its receptor CXCR4 act on various immunological and inflammatory reactions. They are reported to be involved in accumulation and activation of CD4+T cells in a synovial membrane derived from a human patient having a rheumatoid arthritis (*J. Immunol.*, 165, 6590-6598 (2000)). In addition, a CXCR4 inhibitor suppressed recruitment of

leukocytes into a joint also in CIA model mice and reduces the arthritis score dramatically (*J. Immunol.*, 167, 4648-4692 (2001)). In a mouse OVA-induced airway hypersensitivity model, an anti-CXCR4 antibody reduced the number of eosinophiles recruited into a pulmonary interstice to suppress the airway hypersensitivity (*J. Immunol.*, 165, 499-508 (2000)).

[0007] SDF-1 and its receptor CXCR4 are also reported to play an important role in maintaining hemopoietic stem cells in a bone marrow (*J. Exp. Med.*, 185, 111-120 (1997), *Blood*, 97, 3354-3360 (2001)). Accordingly, the inhibition of SDF-1 and CXCR4 is expected to regulate the recruitment of the hemopoietic stem cells into a peripheral blood and to be useful in a peripheral blood stem cell transplantation and this also in a regeneration transplantation therapy.

[0008] SDF-1 and CXCR4 are involved in an infiltration of cells of various cancers such as mammary cancer, prostate cancer and ovarian cancer (*Nature*, 410, 50-56 (2001), *Cancer Res.*, 62, 1832-1837 (2002), *Cancer Res.*, 62, 5930-5938 (2002)), and an anti- antibody inhibited metastasis of a mammary cancer cell into a lung in a human mammary cancer cell line transfection model in SCID mice. Also, since SDF-1 is highly expressed in a human ovarian epithelial tumor, it promotes accumulation of a plasmacytic dendritic cell to inhibit the action of a bone marrow dendritic cell involved in a tumor immune, resulting in an inhibition of the tumor immune (*Nat. Med.*, 12, 1339 (2001)). In addition, it is involved also in proliferation and movement of a non-hodgkin lymphoma cell, and an anti-CXCR4 antibody inhibits proliferation of tumor cells in a human non-hodgkin lymphoma cell transfection model in BID/SCID mice, resulting in an improvement in the mortality in mice (*Cancer Res.*, 62, 3106-3112 (2002)).

[0009] SDF-1 and CXCR4 play important roles in formation of a hippocampal dentate gyrus granulocyte essential for memory and learning, and are involved in progression of an adult disease associated with plasticity and hippocampal pathology such as Alzheimer's disease, cerebral stroke, epilepsy and the like (*Development*, 129, 4249-4260 (2002), *Trends Neuroscience*, 25, 548-549 (2002)).

[0010] SDF-1 and CXCR4 are essential for a function of an auto-reactive B cell involved in progression of a diabetes, and an anti-SDF-1 antibody reduced the blood sugar level in NOD mice and reduced the mature IgM+B cell count in a peripheral tissue (*Immunology*, 107, 222-232 (2002)). SDF-1 was highly expressed in a human arteriosclerotic plaque, resulting in an activation of platelets (*Circ. Res.*, 86, 131-138 (2000)).

[0011] Results observed in SDF-1/CXCR4 knockout mice also indicated that SDF-1 is essential for functions of the blood vessels in central nervous tissues, heart and gastrointestinal tracts in addition to lymphocytes (*Nature*, 382, 635-639 (1996), *Nature*, 393, 591-594 (1998), *Nature*, 393, 595-599 (1998)). Accordingly, it is believed to be involved in diseases of such tissues.

[0012] Thus, chemokine receptors are greatly related to the control of inflammation and immune responses through a mechanism in which they are expressed at certain specified periods in variously specific cells and the effector cells are accumulated in a region where chemokine is produced.

[0013] Acquired immunodeficiency syndrome (called AIDS) which is induced by human immunodeficiency virus (hereinafter referred to as "HIV") is one of the diseases of which their therapeutic methods are most earnestly desired in recent years. Once infection with HIV is completed in a CD4-positive cell which is a principal target cell, HIV repeats its proliferation in the body of the patient and, sooner or later, completely destroys T cell which takes charge of the immunological function. During this process, the immunological function is gradually reduced to cause fever, diarrhea, lymph node enlargement and the like various immunodeficiency conditions which are apt to cause complications with pneumocystis carinii pneumonia and the like various opportunistic infections. Such conditions are the onset of AIDS, and it is well known that they induce and worsen Kaposi sarcoma and the like malignant tumors.

[0014] As the recent preventive and therapeutic methods for AIDS, attempts have been made to, e.g., (1) inhibit growth of HIV by the administration of a reverse transcriptase inhibitor or a protease inhibitor and (2) prevent or alleviate opportunistic infections by the administration of a drug having immunopotential activity.

[0015] Helper T cells which take charge of the central of immune system are mainly infected with HIV. It is known since 1985 that HIV uses the membrane protein CD4 expressing on the membrane of T cells in the infection (*Cell*, 52, 631 (1985)). The CD4 molecule is composed of 433 amino acid residues, and its expression can be found in macrophages, some B cells, vascular endothelial cells, Langerhans' cells in skin tissues, dendritic cells in lymphoid tissues, glia cells of the central nervous system and the like, in addition to the mature helper T cells. However, since it has been revealed that the infection with HIV is not completed by the CD4 molecule alone, a possibility has been suggested on the presence of factors other than the CD4 molecule, which are related to the infection of cells with HIV.

[0016] In 1996, a cell membrane protein called Fusin was identified as a factor other than the CD4 molecule, which is related to the HIV infection (*Science*, 272, 872 (1996)). It was confirmed that this Fusin molecule is a receptor (namely, CXCR4) of SDF-1. In addition, it was confirmed also *in vitro* that the SDF-1 specifically inhibits infection of T cell tropic (X4) HIV (*Nature*, 382, 829 (1996), *Nature*, 382, 833 (1996)). That is, it is considered that the HIV infection was inhibited by the binding of SDF-1 to CXCR4 preceding HIV, thereby depriving HIV of a foothold for infecting cells.

[0017] Also at that time, it was discovered that another chemokine receptor CCR5, which is a receptor of RANTES, MIP-1 α and MIP-1 β , is also used at the time of the infection with a macrophage tropic (R5) HIV (*Science*, 272, 1955 (1996)).

[0018] Accordingly, substances which can compete with CXCR4 and CCR5 for HIV, or which can bind to HIV virus thus causing the virus unable to bind to CXCR4 and CCR5, could become HIV infection inhibitors. Also, there is a case in which a low molecular compound initially discovered as an HIV infection inhibitor was actually a CXCR4 antagonist (*Nature Medicine*, 4, 72 (1998)).

[0019] Based on the above, a chemokine and a chemokine receptor are deeply involved in inflammation, immune disease or HIV infection. A compound having an ability of regulating CXCR4 is effective in treatment and prevention, for example, of an inflammatory/immune disease, allergic disease, infectious disease, especially HIV infection and accompanying diseases, psychoneurotic disease, cerebral disease, cardiovascular disease, metabolic disease and cancerous disease. In addition, it is also useful in cell medicine and regeneration medicine. The cell medicine includes peripheral blood stem cell recruitment and *in vitro* and *in vivo* proliferation of a stem cell for the purpose of a gene therapy. The regeneration medicine includes transplantation medicine such as various organ transplantations including bone marrow transplantation, peripheral blood stem cell transplantation and tissue repair. The transplantation medicine agent is an agent used in the bone marrow transplantation, peripheral blood stem cell transplantation or various organ transplantation. The transplantation medicine agent includes, for example, an infection-preventing agent or immunosuppressant. Those included also are agents intended to supplement and/or enhance the therapeutic effect in the regeneration medicine. An transplantation medicine agent has an effect, for example, of migrating a stem cell from a bone marrow into a peripheral blood or to increase leukocyte rapidly to a normal level.

[0020] The inflammatory/immune diseases include, for example, rheumatoid arthritis, arthritis, gout, transplanted organ rejection, graft versus host disease (GVHD), nephritis, psoriasis, rhinitis, conjunctivitis, multiple sclerosis, ulcerative colitis, Crohn's disease, shock accompanied with bacterial infection, pulmonary fibrosis, systemic response syndrome (SIRS), acute pulmonary disorder, diabetes and the like.

[0021] The allergic diseases include, for example, asthma, atopic dermatitis, rhinitis, conjunctivitis and the like.

[0022] The infectious diseases, especially HIV infection and accompanying diseases, include, for example, acquired immunodeficiency syndrome (AIDS), candidosis, carinii pneumonia, cytomegalovirus retinitis, Kaposi's sarcoma, malignant lymphoma, AIDS encephalopathy, bacterial sepsis and the like.

[0023] The psychoneurotic diseases and the cerebral diseases include, for example, dementia such as Alzheimer's disease, Parkinson's disease, cerebral stroke, cerebral infarction, cerebral hemorrhage, epilepsy, schizophrenia, peripheral nervous disorder and the like.

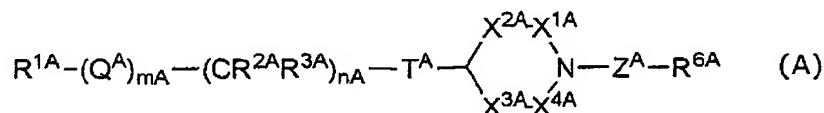
[0024] The cardiovascular diseases include, for example, arteriosclerosis, ischemic reperfusion injury, hypertension, myocardial infarction, angina pectoris, cardiac insufficiency and the like.

[0025] The metabolic diseases include, for example, diabetes, osteoporosis, prostatic hypertrophy, pollakiuria and the like.

[0026] The cancerous diseases include, for example, mammary cancer, malignant tumor such as malignant lymphoma, cancer metastasis, post-radiotherapy/chemotherapy bone marrow suppression or thrombocytopenia and the like.

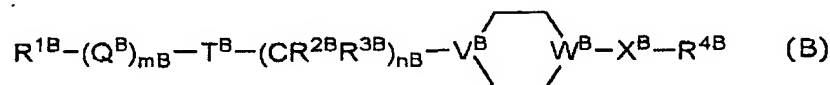
Background art

[0027] In specification of WO01/14333, it is described that piperazine or piperidine derivatives of formula (A)



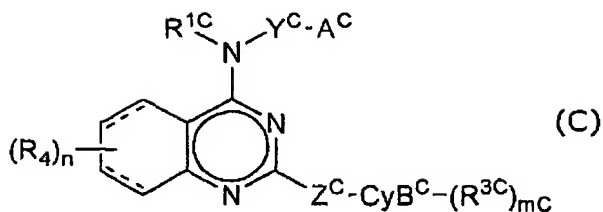
are chemokine receptor (specifically CCR1 or CCR3) regulator, and they are useful as treatment for inflammatory diseases, autoimmune diseases, gastrointestinal discomforts, HIV diseases and systemic diseases *etc.*

[0028] In specification of WO00/58305, it is described that 1,4-piperidine derivatives of formula (B)



are useful for diseases related to chemokine receptor.

[0029] In specification of JP-A-6-192235, it is described that quinazoline derivatives of formula (C)



10 having an effect of inhibiting cGMP phosphodiesterase and TXA2.

[0030] In specification of US 3,956,495, it is described that N-[4-(4-morpholinyl)-2-quinazolinyl]-1,2-ethanediamine dihydrochloride (CAS No. 59870-53-0), N,N-diethyl-N'-[2-(1-pyrrolidinyl)-4-quinazolinyl]-1,2-ethanediamine (CAS No. 59870-50-70) and N,N-diethyl-N'-[2-(1-pyrrolidinyl)-4-quinazolinyl]-1,2-ethanediamine dihydrochloride (CAS No. 59870-51-8) are having an effect of inhibiting platelet aggregation.

15 **[0031]** In specification of JP-A-3-14568, N,N-diethyl-N'-[2-(4-phenyl-1-piperidinyl)-4-pyrimidinyl]-1,2-ethylenediamine (CAS No. 131039-38-8) is described as nervous system drugs.

[0032] In specification of WO95/05383, N-[(3,4-dihydro-2H-1-benzopyran-2-yl)methyl]-N'-[2-(1-piperidinyl)-4-pyrimidinyl]-1,3-propanediamine oxalate (CAS No. 169747-23-3) is having an effect of vasoconstriction.

20 **[0033]** In specification of DE1794396, it is described that 7-[4-[4,6-bis(hexahydro-1H-azepin-1-yl)-1,3,5-triazin-2-yl]amino-2H-1,2,3-triazol-2-yl]-3-phenyl-2H-1-benzopyran-2-one (CAS No. 19695-38-6) is useful as fluorescent brightening agent.

[0034] In specification of JP-A-51-9759, N-[4-(hexahydro-1H-azepin-1-yl)thieno[3,2-d]pyrimidin-2-yl]-1,4-butanediamine (CAS No. 31895-98-4) is described.

25 **[0035]** Other than those above, N-[(3,4-dihydro-2H-1-benzopyran-2-yl)methyl]-N'-[2-(1-piperidinyl)-4-pyrimidinyl]-1,3-propanediamine (CAS No. 169747-22-2), 4-ethoxy-6-(hexahydro-1H-azepin-1-yl)-N-[3-(4-morpholinyl)propyl]-1,3,5-triazin-2-amine (CAS No. 295344-71-7), 4-(hexahydro-1H-azepin-1-yl)-6-methyl-N-[3-(4-morpholinyl)propyl]-1,3,5-triazin-2-amine (CAS No. 332167-02-9), 4-chloro-6-(hexahydro-1H-azepin-1-yl)-N-[2-(4-morpholinyl)ethyl]-1,3,5-triazin-2-amine (CAS No. 337484-66-9), 4-(hexahydro-1H-azepin-1-yl)-6-methoxy-N-[3-(4-morpholinyl)propyl]-1,3,5-triazin-2-amine (CAS No. 384845-62-9) are known.

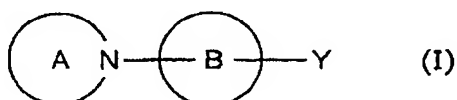
DISCLOSURE OF THE INVENTION

35 **[0036]** It is desired that safety CXCR4 regulators that are useful as preventives and/or treatments for various inflammatory diseases, various allergic diseases, acquired immunodeficiency syndrome, infection with human immunodeficiency virus, or agents for regeneration therapy are developed.

[0037] In order to find a compound binding CXCR4, the present inventors have conducted intensive studies and found that the compounds represented by formulae (I) and (II), salts thereof, N-oxides thereof or solvates thereof, or prodrugs of the same regulate CXCR4 and they are useful as preventing and/or treatment for various diseases, and thus the present invention has been accomplished.

40 **[0038]** The present invention relates to

[1] a compound represented by formula (I):



50 wherein ring A represents a nitrogen-containing heterocyclic group which may have a substituent(s); ring B represents a homocyclic group which may have a substituent(s) or a heterocyclic group which may have a substituent(s); and Y represents a hydrocarbon group which may have a substituent(s), a heterocyclic group which may have a substituent(s), an amino group which may be protected, a hydroxyl group which may be protected or a mercapto group which may be protected,

a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof,

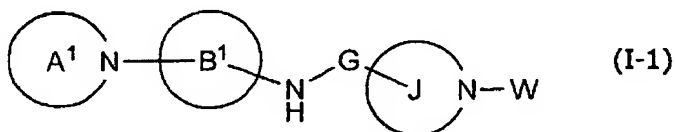
55 [2] the compound according to the above-described [1], wherein ring A is a 5- to 10-membered nitrogen-containing heterocyclic group which may have a substituent(s),

[3] the compound according to the above-described [1], wherein ring B is a nitrogen-containing heterocyclic group which may have a substituent(s),

[4] the compound according to the above-described [1], wherein Y is

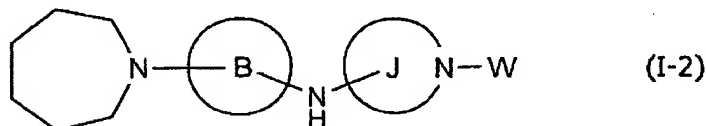


wherein G represents a bond or a spacer containing 1 to 3 atoms as a main chain; ring J represents a 4- to 7-membered nitrogen-containing heterocyclic group; and W represents hydrogen, a hydrocarbon group which may have a substituent(s) or a heterocyclic group which may have a substituent(s),
 [5] the compound according to the above-described [1], which is represented by formula (I-1):

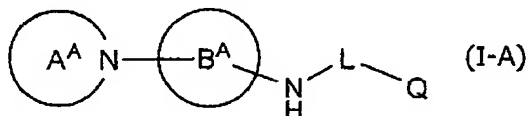


wherein ring A¹ represents a 5- to 10-membered nitrogen-containing saturated heterocyclic group which may have a substituent(s), or a 5- to 10-membered nitrogen-containing heterocyclic group which has one double bond and which may have a substituent(s); ring B¹ represents a 6- to 11-membered nitrogen-containing monocyclic or bicyclic heterocyclic group which may have a substituent(s); and other symbols have the same meanings as those described in the above-described [4],

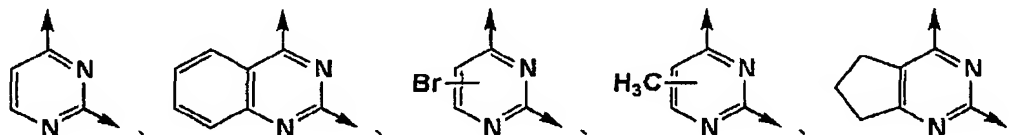
[6] the compound according to the above-described [1], which is represented by formula (I-2):

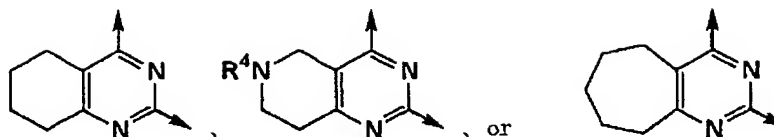


wherein all symbols have the same meanings as those described in the above-described [1] or [4],
 [7] a compound represented by formula (I-A):

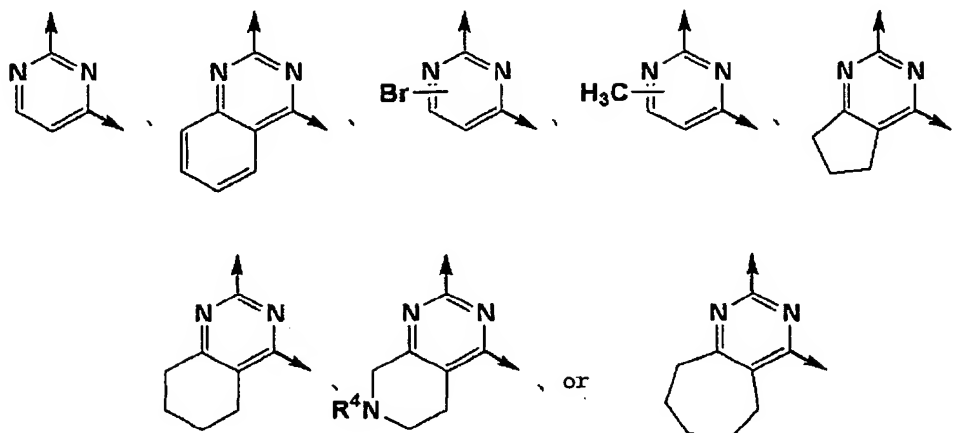


wherein ring A^A represents a 4- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which is saturated or has one double bond and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom;
 ring B^A represents BA¹ or BA²;
 BA¹ represents:





BA² represents:



R⁴ represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with 1 to 5 of R¹⁰, (iii) a C3-8 carbocyclic group which may be substituted with 1 to 5 of R³, (iv) a 5- to 15-membered heterocyclic group which contains 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom and which may be substituted with 1 to 5 of R³, (v) COR⁵ wherein R⁵ represents C1-15 alkyl, C2-15 alkenyl, C2-15 alkynyl or phenyl, or (vi) COOR⁶ wherein R⁶ represents C1-15 alkyl, C2-15 alkenyl, C2-15 alkynyl or phenyl; the upward arrow represents a binding position to ring A¹; and the right-downward arrow represents a binding position to the nitrogen atom bound to L;

L represents (1) a bond, (2) C1-8 alkylene, C2-8 alkenylene or C2-8 alkynylene, wherein the alkylene, alkenylene and alkynylene each may be substituted with 1 to 5 of R¹⁰, or (3) a C3-8 carbocyclic group which may be substituted with R³;

Q represents (1) NR¹R² wherein R¹ and R² each independently represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with 1 to 5 of R¹⁰, (iii) a C3-8 carbocyclic group which may be substituted with 1 to 5 of R³, or (iv) a 5- to 15-membered heterocyclic group which contains 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom and which may be substituted 1 to 5 of R³, or (2) ring C; ring C represents a 4- to 15-membered heterocyclic group which contains at least one nitrogen atom and may further contain 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom and which may be substituted with 1 to 5 of R³;

plural R³'s each independently represents (1) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl, wherein the alkyl, alkenyl and alkynyl may be substituted with 1 to 5 of R¹⁰, (2) oxo, or (3) R¹⁰;

plural R¹⁰'s each independently represents (1) OR¹¹, (2) OCOR¹², (3) OCOOR¹³, (4) NR¹⁴R¹⁵, (5) NR¹⁶COR¹², (6) NR¹⁶CONR¹⁴R¹⁵, (7) NR¹⁶COOR¹³, (8) COOR¹³, (9) COR¹², (10) CONR¹⁴R¹⁵, (11) SO₂R¹², (12) SOR²², (13) SO₂NR²⁴R²⁵, (14) NR¹⁶SO₂R¹², (15) B(OH)₂, (16) SR¹¹, (17) halogen, (18) nitro, (19) cyano, or (20) ring D;

R¹¹ represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl, wherein the alkyl, alkenyl and alkynyl may be substituted with 1 to 5 of halogen, NR¹⁴R¹⁵, OR²¹, SR²¹, COOR¹³, or ring D, or (iii) ring D; R¹², R¹³, R¹⁴, R¹⁵ and R¹⁶ each independently represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with ring D, or (iii) ring D;

ring D represents a C3-15 monocyclic, bicyclic or tricyclic carbocyclic group, or a 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains 1 to 4 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom; and

ring D may be substituted with 1 to 5 of the groups selected from the following (1) to (22):

(1) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl, wherein the alkyl, alkenyl or alkynyl may be substituted

with 1 to 5 of OR²¹, OCOR²², OCOOR²³, NR²⁴R²⁵, NR²⁶COR²², NR²⁶CONR²⁴R²⁵, NR²⁶COOR²³, COOR²³, COR²², CONR²⁴R²⁵, SO₂R²², SOR²², SO₂NR²⁴R²⁵, NR²⁶SO₂R²², B(OH)₂, SR²¹, halogen, nitro or cyano, (2) oxo, (3) OR²¹, (4) OCOR²², (5) OCOOR²³, (6) NR²⁴R²⁵, (7) NR²⁶COR²², (8) NR²⁶CONR²⁴R²⁵, (9) NR²⁶COOR²³, (10) COOR²³, (11) COR²², (12) CONR²⁴R²⁵, (13) SO₂R²², (14) SOR²², (15) SO₂NR²⁴R²⁵, (16) NR²⁶SO₂R²², (17) B(OH)₂, (18) SR²¹, (19) halogen, (20) nitro, (21) cyano or (22) ring E;

R²¹ represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with COR²², NR²⁴R²⁵ or ring E, or (iii) ring E;

R²², R²³, R²⁴, R²⁵ and R²⁶ each independently represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with ring E, or (iii) ring E;

ring E represents a C3-15 monocyclic, bicyclic or tricyclic carbocyclic group, or a 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains 1 to 4 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom, and

ring E may be substituted with 1 to 5 of (i) C1-15 alkyl which may be substituted with phenyl, (ii) halogen, (iii) phenyl, (iv) C1-15 alkoxy, (v) hydroxyl, (vi) amino, (vii) mono(C1-8 alkyl)amino, or (viii) di(C1-8 alkyl)amino;

ring A^A may be substituted with 1-5 of R^a;

ring B^A may be substituted with 1-5 of R^b;

R^a and R^b each independently represents a group which has the same meaning as the group represented by R³; and

wherein the following compounds (1) to (6) are excluded:

(1) N-[4-(4-morpholinyl)-2-quinazolinyl]-1,2-ethanediamine dihydrochloride,

(2) N,N-dimethyl-N'-[2-(4-phenyl-1-piperidinyl)-4-pyrimidinyl]-1,2-ethylenediamine,

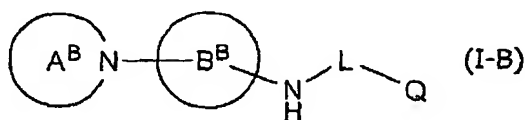
(3) N-[(3,4-dihydro-2H-1-benzopyran-2-yl)methyl]-N'-[2-(1-piperidinyl)-4-pyrimidinyl]-1,3-propanediamine,

(4) N-[(3,4-dihydro-2H-1-benzopyran-2-yl)methyl]-N'-[2-(1-piperidinyl)-4-pyrimidinyl]-1,3-propanediamine oxalate,

(5) N,N-diethyl-N'-[2-(1-pyrrolidinyl)-4-quinazolinyl]-1,2-ethanediamine, and

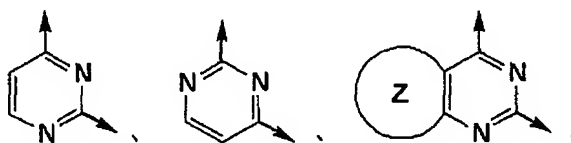
(6) N,N-diethyl-N'-[2-(1-pyrrolidinyl)-4-quinazolinyl]-1,2-ethanediamine dihydrochloride, a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof,

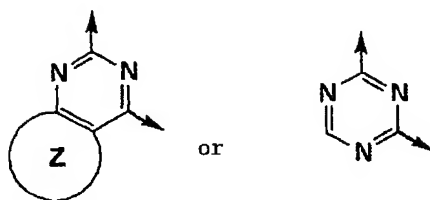
[8] a compound represented by formula (I-B):



wherein ring A^B represents a 7- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which is saturated or contains one double bond and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom;

ring B^B represents:





wherein ring Z represents a C5-10 monocyclic or bicyclic carbocyclic group, or a 5- to 10-membered monocyclic or bicyclic heterocyclic group which may contain 1 or 2 nitrogen atoms, one oxygen atom and/or one sulfur atom; the upward arrow represents a binding position to ring A^B; and the right-downward arrow represents a binding position to the nitrogen atom bound to L; ring A^B may be substituted with 1 to 5 of R^a; ring B^B may be substituted with 1 to 5 of R^b; and R^a, R^b and other symbols have the same meanings as those described in the above-described [7], and

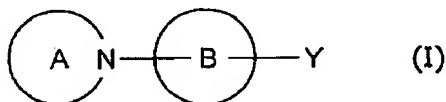
wherein the following compounds (1) to (7) are excluded:

- (1) N-[4-(hexahydro-1H-azepin-1-yl)thieno[3,2-d]pyrimidin-2-yl]-1,4-butanediamine dihydrochloride,
- (2) 7-[4-[4,6-bis(hexahydro-1H-azepin-1-yl)-1,3,5-triazin-2-yl]amino-2H-1,2,3-triazol-2-yl]-3-phenyl-2H-1-benzopyran-2-one,
- (3) 4-ethoxy-6-(hexahydro-1H-azepin-1-yl)-N-[3-(4-morpholinyl)propyl]-1,3,5-triazin-2-amine,
- (4) 4-(hexahydro-1H-azepin-1-yl)-6-methyl-N-[3-(4-morpholinyl)propyl]-1,3,5-triazin-2-amine,
- (5) 4-chloro-6-(hexahydro-1H-azepin-1-yl)-N-[2-(4-morpholinyl)ethyl]-1,3,5-triazin-2-amine,
- (6) 4-(hexahydro-1H-azepin-1-yl)-6-methoxy-N-[3-(4-morpholinyl)propyl]-1,3,5-triazin-2-amine, and
- (7) N-[4-(hexahydro-1H-azepin-1-yl)thieno[3,2-d]pyrimidin-2-yl]-1,4-butanediamine, or

a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof,
[9] the compound according to any one of the above-described [1], [7] and [8], which is

- (1) N-(4-azepan-1-ylpyrimidin-2-yl)ethane-1,2-diamine,
- (2) N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²,N²-dimethylethane-1,2-diamine,
- (3) 4-azepan-1-yl-N-[(3S)-1-cyclohexylpyrrolidin-3-yl]pyrimidin-2-amine,
- (4) 4-azepan-1-yl-N-[(3S)-1-benzylpyrrolidin-3-yl]pyrimidin-2-amine,
- (5) 4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)piperidin-3-yl]pyrimidin-2-amine,
- (6) 4-azepan-1-yl-N-[(3S)-1-cyclohexylpiperidin-3-yl]pyrimidin-2-amine,
- (7) 4-azepan-1-yl-N-[(3S)-1-tetrahydro-2H-pyran-4-ylpiperidin-3-yl]pyrimidin-2-amine,
- (8) 4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanol, or
- (9) (3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclohexylcarbonyl)-1,4'-bipiperidin-3-amine,

[10] a pharmaceutical composition, which comprises a compound represented by formula (I):

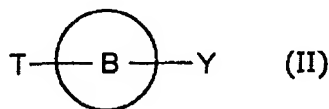


wherein all symbols have the same meanings as those described in the above-described [1], a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof,

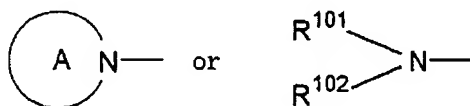
- [11] the pharmaceutical composition according to the above-described [10], which is a CXCR4 regulating agent,
- [12] the pharmaceutical composition according to the above-described [11], wherein the CXCR4 regulating agent is a CXCR4 antagonist,
- [13] the pharmaceutical composition according to the above-described [12], which is a preventive and/or therapeutic agent for human immunodeficiency virus infection,
- [14] the pharmaceutical composition according to the above-described [13], which is a preventive and/or therapeutic agent for acquired immunodeficiency syndrome,
- [15] the pharmaceutical composition according to the above-described [10], which is an agent for regeneration medicine,

[16] the pharmaceutical composition according to the above-described [15], wherein the agent for regeneration medicine is an agent for transplantation medicine,

[17] a CXCR4 regulating agent, which comprises a compound represented by formula (II):

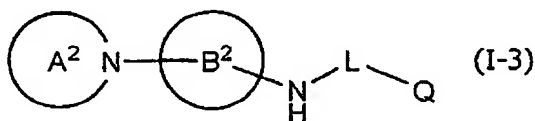


wherein T represents



wherein R^{101} and R^{102} each independently represents hydrogen or a hydrocarbon group which may have a substituent(s); ring A has the same meaning as that described in the above-described [1]; and other symbols have the same meanings as those described in the above-described [1],

a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, as an active ingredient,
[18] the agent according to the above-described [17], wherein the CXCR4 regulating agent is a CXCR4 antagonist,
[19] a CXCR4 regulating agent, which comprises a compound represented by formula (I-3):



wherein ring A^2 represents a 4- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom; ring B^2 represents a 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom; ring A^2 may be substituted with 1 to 5 of R^a ; ring B^2 may be substituted with 1 to 5 of R^b ; and R^a , R^b and other symbols have the same meanings as those described in the above-described [7],

a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, as an active ingredient,
[20] the CXCR4 regulating agent according to the above-described [19], which is a CXCR4 antagonist,
[21] a CXCR4 regulating agent, which comprises the compound represented by formula (I-A) according to the above-described [7], a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, as an active ingredient,

[22] the CXCR4 regulating agent according to the above-described [21], which is a CXCR4 antagonist,
[23] a CXCR4 regulating agent, which comprises the compound represented by formula (I-B) according to the above-described [8], a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, as an active ingredient,

[24] the CXCR4 regulating agent according to the above-described [23], which is a CXCR4 antagonist,
[25] the CXCR4 regulating agent according to the above-described [17] or [19], which is a preventive and/or therapeutic agent for inflammatory/immune diseases, allergic diseases, infectious diseases, HIV infection or diseases accompanied therewith, psychoneurotic diseases, cerebral diseases, cardiovascular diseases, metabolic diseases and cancerous diseases,

[26] the CXCR4 regulating agent according to the above-described [25], which is a preventive and/or therapeutic agent for HIV infection or diseases accompanied therewith,

[27] the CXCR4 regulating agent according to the above-described [17] or [19], which is useful for regeneration medicine,

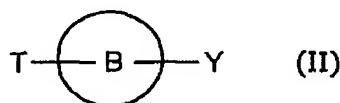
[28] a medicament which comprises the compound according to any one of the above-described [1], [7], [8] and [17], a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, in combination with one or at least two of a reverse transferase inhibitor, a protease inhibitor, a CCR2 antagonist, a CCR3 antagonist, a CCR4 an-

tagonist, a CCR5 antagonist, a fusion inhibitor, an antibody against a surface antigen of HIV-1, and a vaccine of HIV-1,

[29] the medicament according to the above-described [28], wherein the reverse transferase inhibitor is one or at least two selected from zidovudine, didanosine, zalcitabine, stavudine, lamivudine, abacavir, adefovir, dipivoxil, emtricitabine, tenofovir, nevirapine, nevirapine, efavirenz and capravirine,

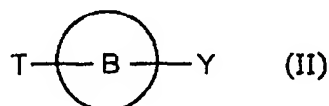
[30] the medicament according to the above-described [28], wherein the protease inhibitor is one or at least two selected from indinavir, ritonavir, nelfinavir, saquinavir, amprenavir, lopinavir and lopinavir,

[31] a method for antagonizing CXCR4 in a mammal, which comprises administering to a mammal an effective amount of a compound represented by formula (II):



wherein all symbols have the same meanings as those described in the above-described [1] or [17], a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof,

[32] use of a compound represented by formula (II):



wherein all symbols have the same meanings as described in the above-described [1] or [17],

a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof for the manufacture of a CXCR4 antagonist.

DETAILED DESCRIPTION

[0039] The "nitrogen-containing heterocycle" in the "nitrogen-containing heterocyclic group which may have a substituent(s)" represented by ring A in the compound represented by formula (I) according to the present invention refers to a monocyclic, bicyclic or tricyclic heterocycle which may contain, in addition to the nitrogen atom indicated in ring A in formula (I), 1 to 6 hetero atoms selected from nitrogen, oxygen and sulfur atoms. The "nitrogen-containing heterocycle" includes, for example, a "3- to 15- membered nitrogen-containing unsaturated monocyclic, bicyclic or tricyclic heterocycle", "3- to 15-membered nitrogen-containing saturated monocyclic, bicyclic or tricyclic heterocycle" and the like.

[0040] The "3- to 15-membered nitrogen-containing unsaturated monocyclic, bicyclic or tricyclic heterocycle" includes, for example, pyrrole, imidazole, triazole, tetrazole, pyrazole, azepine, diazepine, indole, isoindole, indazole, purine, benzimidazole, benzazepine, benzodiazepine, benzotriazole, carbazole, beta-carboline, phenothiazine, phenoxazine, perimidine, pyrrolidine, imidazoline, triazoline, tetrazoline, pyrazoline, dihydropyridine, tetrahydropyridine, dihydropyrazine, tetrahydropyrazine, dihydropyrimidine, tetrahydropyrimidine, dihydropyridazine, tetrahydropyridazine, dihydroazepine, tetrahydroazepine, dihydrodiazepine, tetrahydrodiazepine, dihydrooxazole, dihydroisoxazole, dihydrothiazole, dihydroisothiazole, dihydrofurazan, dihydrooxadiazole, dihydrooxazine, dihydrooxadiazine, dihydrooxazepine, tetrahydrooxazepine, dihydrooxadiazepine, tetrahydrooxadiazepine, dihydrothiadiazole, dihydrothiazine, dihydrothiadiazine, dihydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine, indoline, isoindoline, dihydroindazole, dihydroquinoline, tetrahydroquinoline, dihydroisoquinoline, tetrahydroisoquinoline, dihydrophthalazine, tetrahydrophthalazine, dihydronaphthyridine, tetrahydronaphthyridine, dihydroquinoxaline, tetrahydroquinoxaline, dihydroquinazoline, tetrahydroquinazoline, dihydrocinnoline, tetrahydrocinnoline, dihydrobenzoxazine, dihydrobenzothiazine, pyrazinomorpholine, dihydrobenzoxazole, dihydrobenzothiazole, dihydrobenzimidazole, dihydrobenzazepine, tetrahydrobenzazepine, dihydrobenzodiazepine, tetrahydrobenzodiazepine, dihydrobenzoxazepine, tetrahydrobenzoxazepine, dihydrocarbazole, tetrahydrocarbazole, dihydroacridine, tetrahydroacridine, hexahydroazocine, hexahydroazocine, hexahydrodiazocine, hexahydrodiazocine, octahydroazecine, octahydrodiazecine ring *etc.*

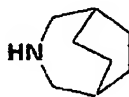
[0041] The "3- to 15-membered nitrogen-containing saturated monocyclic, bicyclic or tricyclic heterocycle" includes, for example, aziridine, azetidione, pyrrolidine, imidazolidine, triazolidine, tetrazolidine, pyrazolidine, piperidine, piperazine, perhydropyrimidine, perhydropyridazine, perhydroazepine, perhydrodiazepine, perhydroazocine, tetrahydrooxazole (oxazolidine), tetrahydroisoxazole (isoxazolidine), tetrahydrothiazole (thiazolidine), tetrahydroisothiazole (isothi-

azolidine), tetrahydrofuran, tetrahydrooxadiazole (oxadiazolidine), tetrahydrooxazine, tetrahydrooxadiazine, perhydrooxazepine, perhydrooxadiazepine, tetrahydrothiadiazole (thiadiazolidine), tetrahydrothiazine, tetrahydrothiadiazine, tetrahydrothiazepine, perhydrothiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, perhydroindazole, perhydroquinoline, perhydroisoquinoline, perhydrophthalazine, perhydronaphthyridine, perhydroquinoxaline, perhydroquinazoline, perhydrocinnoline, perhydrobenzoxazole, perhydrobenzothiazole, perhydrobenzimidazole, perhydrocarbazole, perhydroacridine, perhydroazonine, perhydroazecine, azaundecane, azadodecane, azatridecane, azatetradecane, azapentadecane, perhydrodiazocine, perhydrodiazonine, perhydrodiazecine, diazaundecane, diazadodecane, diazatridecane, diazatetradecane, diazapentadecane, perhydroindole, perhydroisoindole, perhydro-beta-carboline, perhydrophenazine, perhydrophenothiadine, perhydrophenoxadine, perhydrophenanthridine, perhydrophenanthroline, perhydroperimidine, azabicyclo[3.2.2]nonane, azabicyclo[3.3.2]decane, azabicyclo[2.2.2]octane, azabicyclo[3.3.3]undecane, azabicyclo[4.3.3]dodecane, azabicyclo[4.4.3]tridecane, azabicyclo[4.4.4]tetradecane *etc.*

[0042] The "Nitrogen-containing heterocycle" represented by ring A is preferably "5- to 10- membered nitrogen-containing heterocycle". Concretely, "5- to 10- membered nitrogen-containing unsaturated heterocycle" includes, for example, pyrrole, imidazole, triazole, tetrazole, pyrazole, azepine, diazepine, indole, isoindole, indazole, purine, benzimidazole, benzotriazole, pyrroline, imidazoline, triazoline, tetrazoline, pyrazoline, dihydropyridine, tetrahydropyridine, dihydropyrazine, tetrahydropyrazine, dihydropyrimidine, tetrahydropyrimidine, dihydropyridazine, tetrahydropyridazine, dihydroazepine, tetrahydroazepine, dihydrodiazepine, tetrahydrodiazepine, dihydrooxazole, dihydroisoxazole, dihydrothiazole, dihydroisothiazole, dihydrofuran, dihydrooxadiazole, dihydrooxazine, dihydrooxadiazine, dihydrooxazepine, tetrahydrooxazepine, dihydrooxadiazepine, tetrahydrooxadiazepine, dihydrothiadiazole, dihydrothiazine, dihydrothiadiazine, dihydrothiazepine, tetrahydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine, indoline, isoindoline, dihydroindazole, dihydroquinoline, tetrahydroquinoline, dihydroisoquinoline, tetrahydroisoquinoline, dihydrophthalazine, tetrahydrophthalazine, dihydronaphthyridine, tetrahydronaphthyridine, dihydroquinoxaline, tetrahydroquinoxaline, dihydroquinazoline, tetrahydroquinazoline, dihydrocinnoline, tetrahydrocinnoline, dihydrobenzoxazine, dihydrobenzothiazine, pyrazinomorpholine, dihydrobenzoxazole, dihydrobenzothiazole, dihydrobenzimidazole, hexahydroazocine, hexahydroazonine, hexahydrodiazocine, hexahydrodiazonine, octahydroazecine, octahydrodiazecine ring *etc.*

[0043] The "5- to 10- membered nitrogen-containing saturated heterocycle" includes, for example, pyrrolidine, imidazolidine, triazolidine, tetrazolidine, pyrazolidine, piperidine, piperazine, perhydropyrimidine, perhydropyridazine, perhydroazepine, perhydrodiazepine, perhydroazocine, tetrahydrooxazole (oxazolidine), tetrahydroisoxazole (isoxazolidine), tetrahydrothiazole (thiazolidine), tetrahydroisothiazole (isothiazolidine), tetrahydrofuran, tetrahydrooxadiazole (oxadiazolidine), tetrahydrooxazine, tetrahydrooxadiazine, perhydrooxazepine, perhydrooxadiazepine, tetrahydrothiadiazole (thiadiazolidine), tetrahydrothiazine, tetrahydrothiadiazine, perhydrothiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, perhydroindazole, perhydroquinoline, perhydroisoquinoline, perhydrophthalazine, perhydronaphthyridine, perhydroquinoxaline, perhydrocinnoline, perhydrocinnoline, perhydrobenzoxazole, perhydrobenzothiazole, perhydrobenzimidazole, perhydroazonine, perhydroazecine, perhydrodiazocine, perhydrodiazonine, perhydrodiazecine, perhydroindole, perhydroisoindole, azabicyclo[3.2.2]nonane, azabicyclo[3.3.2]decane, azabicyclo[2.2.2]octane *etc.*

[0044] More preferably, ring A is perhydroazepine, perhydroazocine, piperidine,



etc.

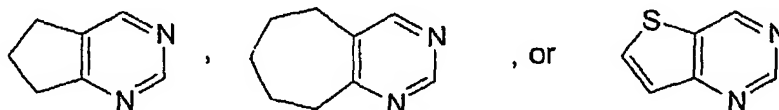
[0045] Ring A may be substituted with 1 to 5 of R^a (R^a has the same meaning as R³ which has the same meanings as described above.).

[0046] The "Homocycle" in the "homocyclic group which may have a substituent(s)" represented by ring B includes, for example, a "cyclic hydrocarbon" *etc.* The "cyclic hydrocarbon" includes, for example, "unsaturated cyclic hydrocarbon" or "saturated cyclic hydrocarbon". The "saturated cyclic hydrocarbon" includes, for example, "3- to 15-membered saturated cyclic hydrocarbon" such as cycloalkane which includes cyclopropane, cyclobutane, cyclopentane, cyclohexane, cycloheptane, cyclooctane, cyclononane, cyclodecane, cycloundecane, cyclododecane, cyclotridecane, cyclotetradecane or cyclopentadecane *etc.*; perhydropentalene; perhydroazulene; perhydroindene; perhydronaphthalene; perhydroheptalene; spiro[4.4]nonane; spiro[4.5]decane; spiro[5.5]undecane; bicyclo[2.2.1]heptane; bicyclo[3.1.1]heptane; bicyclo[2.2.2]octane; adamantane; noradamantane *etc.* The "unsaturated cyclic hydrocarbon" includes, for example, "3- to 15- membered unsaturated cyclic hydrocarbon" such as cycloalkene which is cyclopentene, cyclohexene, cycloheptene, cyclooctene, cyclopentadiene, cyclohexadiene, cycloheptadiene or cyclooctadiene *etc.*; benzene; pentalene; azulene; indene; indan; naphthalene; dihydronaphthalene; tetrahydronaphthalene; heptalene; biphenylene; as-

indacene; s-indacene; acenaphthene; acenaphthylene; fluorene; phenalene; phenanthrene; anthracene; bicyclo[2.2.1]hept-2-ene; bicyclo[3.1.1]hept-2-ene; bicyclo[2.2.2]oct-2-ene *etc.*

[0047] The "heterocycle" in The "heterocyclic group which may have a substituent(s)" represented by ring B refers to a monocyclic, bicyclic or tricyclic heterocycle which may contain 1 to 7 hetero atoms selected from nitrogen, oxygen and sulfur atoms. The "heterocycle" includes, for example, a "3- to 15-membered unsaturated monocyclic, bicyclic or tricyclic heterocycle", a "3- to 15-membered saturated monocyclic, bicyclic or tricyclic heterocycle" and the like.

[0048] The "3- to 15-membered unsaturated monocyclic, bicyclic or tricyclic heterocycle" includes, for example, pyrrole, imidazole, triazole, tetrazole, pyrazole, pyridine, pyrazine, pyrimidine, pyridazine, triazine, azepine, diazepine, furan, pyran, oxepine, thiophene, thiopyran, thiepine, oxazole, isoxazole, thiazole, isothiazole, furazan, oxadiazole, oxazine, oxadiazine, oxazepine, oxadiazepine, thiadiazole, thiazine, thiadiazine, thiazepine, thiadiazepine, indole, isoindole, indolizine, benzofuran, isobenzofuran, benzothiophene, isobenzothiophene, dithianaphthalene, indazole, quinoline, isoquinoline, quinolizine, purine, phthalazine, pteridine, naphthyridine, quinoxaline, quinoxaline, cinnoline, benzoxazole, benzothiazole, benzimidazole, chromene, benzoxepine, benzoxazepine, benzoxadiazepine, benzothiepine, benzothiazepine, benzothiadiazepine, benzazepine, benzodiazepine, benzofurazan, benzothiadiaazole, benzotriazole, carbazole, beta-carboline, acridine, phenazine, dibenzofuran, xanthene, dibenzothiophene, phenothiazine, phenoxazine, phenoxathiin, thianthrene, phenanthridine, phenanthroline, perimidine, pyrroline, imidazoline, triazoline, tetrazoline, pyrazoline, dihydropyridine, tetrahydropyridine, dihydropyrazine, tetrahydropyrazine, dihydropyrimidine, tetrahydropyrimidine, dihydropyridazine, tetrahydropyridazine, tetrahydrotriazine, dihydroazepine, tetrahydroazepine, dihydrodiazepine, tetrahydrodiazepine, dihydrofuran, dihydropyran, dihydrooxepine, tetrahydrooxepine, dihydrothiophene, dihydrothiopyran, dihydrothiepine, tetrahydrothiepine, dihydrooxazole, dihydroisoxazole, dihydrothiazole, dihydroisothiazole, dihydrofurazan, dihydrooxadiazole, dihydrooxazine, dihydrooxadiazine, dihydrooxazepine, tetrahydrooxazepine, dihydrooxadiazepine, tetrahydrooxadiazepine, dihydrothiadiaazole, dihydrothiazine, dihydrothiadiazine, dihydrothiazepine, tetrahydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine, indoline, isoindoline, dihydrobenzofuran, dihydroisobenzofuran, dihydrobenzothiophene, dihydroisobenzothiophene, dihydroindazole, dihydroquinoline, tetrahydroquinoline, dihydroisoquinoline, tetrahydroisoquinoline, dihydrophthalazine, tetrahydrophthalazine, dihydronaphthyridine, tetrahydronaphthyridine, dihydroquinoxaline, tetrahydroquinoxaline, dihydroquinazoline, tetrahydroquinazoline, dihydrocinnoline, tetrahydrocinnoline, benzoxathiane, dihydrobenzoxazine, dihydrobenzothiazine, pyrazinomorpholine, dihydrobenzoxazole, dihydrobenzothiazole, dihydrobenzimidazole, dihydrobenzazepine, tetrahydrobenzazepine, dihydrobenzodiazepine, tetrahydrobenzodiazepine, benzodioxepane, dihydrobenzoxazepine, tetrahydrobenzoxazepine, dihydrocarbazole, tetrahydrocarbazole, dihydro-beta-carboline, tetrahydro-beta-carboline, dihydroacridine, tetrahydroacridine, dihydrodibenzofuran, dihydrodibenzothiophene, tetrahydrodibenzofuran, tetrahydrodibenzothiophene, dioxindane, benzodioxane, chroman, benzodithiolane, benzodithiane, 6,7,8,9-tetrahydro-5H-pyrido[4',3':4,5]pyrrolo[2,3-b]pyridine, 2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole, 6,7,8,9-tetrahydro-5H-pyrido[3',4':4,5]pyrrolo[2,3-b]pyridine,

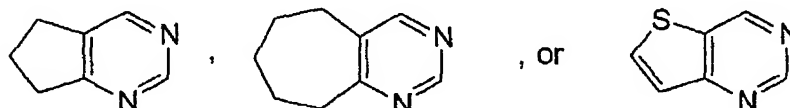


etc.

[0049] "3- to 15-membered saturated monocyclic, bicyclic or tricyclic heterocycle" includes, for example, aziridine, azetidine, pyrrolidine, imidazolidine, triazolidine, tetrazolidine, pyrazolidine, piperidine, piperazine, perhydropyrimidine, perhydropyridazine, perhydroazepine, perhydrodiazepine, perhydroazocine, oxirane, oxetane, tetrahydrofuran, tetrahydropyran, perhydrooxepine, thirane, thietane, tetrahydrothiophene, tetrahydrothiopyran, perhydrothiepine, tetrahydrooxazole (oxazolidine), tetrahydroisoxazole (isoxazolidine), tetrahydrothiazole (thiazolidine), tetrahydroisothiazole (isothiazolidine), tetrahydrofurazan, tetrahydrooxadiazole (oxadiazolidine), tetrahydrooxazine, tetrahydrooxadiazine, perhydrooxazepine, perhydrooxadiazepine, tetrahydrothiadiazole (thiadiazolidine), tetrahydrothiazine, tetrahydrothiadiazine, perhydrothiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, oxathiane, perhydrobenzofuran, perhydroisobenzofuran, perhydrobenzothiophene, perhydroisobenzothiophene, perhydroindazole, perhydroquinoline, perhydroisoquinoline, perhydrophthalazine, perhydronaphthyridine, perhydroquinoxaline, perhydroquinazoline, perhydrocinnoline, perhydrobenzoxazole, perhydrobenzothiazole, perhydrobenzimidazole, perhydrocarbazole, perhydro-beta-carboline, perhydroacridine, perhydrodibenzofuran, perhydrodibenzothiophene, dioxolane, dioxane, dithiolane, dithiane *etc.*

[0050] Ring B is preferably a "nitrogen-containing heterocycle which may have a substituent(s)". The "nitrogen-containing heterocycle" represents a monocyclic, bicyclic or tricyclic heterocycle which contains at least one nitrogen atom and may further contain 1 to 3 hetero atoms selected from nitrogen, oxygen and sulfur atoms. The "nitrogen-containing

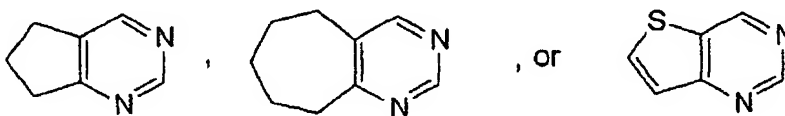
heterocyclic ring" includes, for example, a "5- to 15- membered nitrogen-containing unsaturated monocyclic, bicyclic or tricyclic heterocycle" or a "5- to 15- membered nitrogen-containing saturated monocyclic, bicyclic or tricyclic heterocycle" *etc.* The "5- to 15- membered nitrogen-containing unsaturated monocyclic, bicyclic or tricyclic heterocycle" includes, for example, pyrrole, imidazole, triazole, tetrazole, pyrazole, pyridine, pyrazine, pyrimidine, pyridazine, tri-
 5 azine, azepine, diazepine, oxazole, isoxazole, thiazole, isothiazole, furazan, oxadiazole, oxazine, oxadiazine, ox-
 azepine, oxadiazepine, thiadiazole, thiazine, thiadiazine, thiazepine, thiadiazepine, indole, isoindole, indolizine, inda-
 10 zole, quinoline, isoquinoline, quinolizine, purine, phthalazine, pteridine, naphthyridine, quinoxaline, quinazoline, cin-
 nolizine, benzoxazole, benzothiazole, benzimidazole, benzoxazepine, benzoxadiazepine, benzothiazepine, benzothia-
 diazepine, benzazepine, benzodiazepine, benzofurazan, benzothiadiazone, benzotriazole, carbazole, beta-carboline,
 15 acridine, phenazine, phenothiazine, phenoxazine, phenanthridine, phenanthroline, perimidine, pyrroline, imidazoline,
 triazoline, tetrazoline, pyrazoline, dihydropyridine, tetrahydropyridine, dihydropyrazine, tetrahydropyrazine, dihydropy-
 rimidine, tetrahydropyrimidine, dihydropyridazine, tetrahydropyridazine, tetrahydrotriazine, dihydroazepine, tetrahy-
 droazepine, dihydrodiazepine, tetrahydrodiazepine, dihydrooxazole, dihydroisoxazole, dihydrothiazole, dihydroisothi-
 20 azole, dihydrofurazan, dihydrooxadiazole, dihydrooxazine, dihydrooxadiazine, dihydrooxazepine, tetrahydroox-
 azepine, dihydrooxadiazepine, tetrahydrooxadiazepine, dihydrothiadiazone, dihydrothiazine, dihydrothiadiazine, dihy-
 drothiazepine, tetrahydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine, indoline, isoindoline, dihydroinda-
 zole, dihydroquinoline, tetrahydroquinoline, dihydroisoquinoline, dihydrophthalazine, tetrahy-
 drophthalazine, dihydronaphthyridine, tetrahydronaphthyridine, dihydroquinoxaline, tetrahydroquinoxaline, dihydro-
 25 quinazoline, tetrahydroquinazoline, dihydrocinnoline, tetrahydrocinnoline, dihydrobenzoxazine, dihydrobenzothiazine,
 pyrazinomorpholine, dihydrobenzoxazole, dihydrobenzothiazole, dihydrobenzimidazole, dihydrobenzazepine, tetrahy-
 drobenzazepine, dihydrobenzodiazepine, tetrahydrobenzodiazepine, dihydrobenzoxazepine, tetrahydrobenzox-
 azepine, dihydrocarbazole, tetrahydrocarbazole, dihydro-beta-carboline, tetrahydro-beta-carboline, dihydroacridine,
 tetrahydroacridine,



etc.

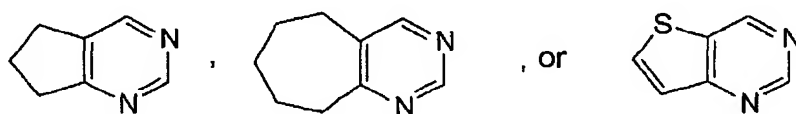
[0051] The "5- to 15- membered nitrogen-containing saturated monocyclic, bicyclic or tricyclic heterocycle" includes, for example, pyrrolidine, imidazolidine, triazolidine, tetrazolidine, pyrazolidine, piperidine, piperazine, perhydropyrimi-
 35 dine, perhydropyridazine, perhydroazepine, perhydrodiazepine, perhydroazocine, tetrahydrooxazole (oxazolidine), tet-
 rahydroisoxazole (isoxazolidine), tetrahydrothiazole (thiazolidine), tetrahydroisothiazole (isothiazolidine), tetrahydro-
 furazan, tetrahydrooxadiazole (oxadiazolidine), tetrahydrooxazine, tetrahydrooxadiazine, perhydrooxazepine, perhy-
 drooxadiazepine, tetrahydrothiadiazone (thiadiazolidine), tetrahydrothiazine, tetrahydrothiadiazine, perhydrothi-
 40 azepine, perhydrothiadiazepine, morpholine, thiomorpholine, perhydroindazole, perhydroquinoline, perhydroisoquin-
 oline, perhydrophthalazine, perhydronaphthyridine, perhydroquinoxaline, perhydroquinazoline, perhydrocinnoline, pe-
 rhydrobenzoxazole, perhydrobenzothiazole, perhydrobenzimidazole, perhydrocarbazole, perhydro-beta-carboline,
 perhydroacridine *etc.* The "Nitrogen-containing heterocyclic ring" is preferably a "6- to 11- membered nitrogen-contain-
 ing monocyclic or bicyclic heterocycle" *etc.* The "6- to 11- membered nitrogen-containing monocyclic or bicyclic hete-
 45 rocycle" includes, for example, a "6- to 11- membered unsaturated monocyclic or bicyclic heterocycle" or a "6- to 11-
 membered saturated monocyclic or bicyclic heterocycle" *etc.* The "6- to 11- membered unsaturated monocyclic or bi-
 cyclic heterocycle" includes, for example, pyridine, pyrazine, pyrimidine, pyridazine, triazine, azepine, diazepine, ox-
 50 azine, oxadiazine, oxazepine, oxadiazepine, thiazine, thiadiazine, thiazepine, thiadiazepine, indole, isoindole, in-
 dolizine, indazole, quinoline, isoquinoline, quinolizine, purine, phthalazine, pteridine, naphthyridine, quinoxaline, quina-
 zoline, cinnoline, benzoxazole, benzothiazole, benzimidazole, benzoxazepine, benzoxadiazepine, benzothiazepine,
 benzothiadiazone, benzazepine, benzodiazepine, benzofurazan, benzothiadiazone, benzotriazole dihydropyridine,
 55 tetrahydropyridine, dihydropyrazine, tetrahydropyrazine, dihydropyrimidine, tetrahydropyrimidine, dihydropyridazine,
 tetrahydropyridazine, tetrahydrotriazine, dihydroazepine, tetrahydroazepine, dihydrodiazepine, tetrahydrodiazepine,
 dihydrooxazine, dihydrooxadiazine, dihydrooxazepine, tetrahydrooxazepine, dihydrooxadiazepine, tetrahydrooxadi-
 azepine, dihydrothiazine, dihydrothiadiazine, dihydrothiazepine, tetrahydrothiazepine, dihydrothiadiazepine, tetrahy-
 drothiadiazepine, indoline, isoindoline, dihydroindazole, dihydroquinoline, tetrahydroquinoline, dihydroisoquinoline,
 tetrahydroisoquinoline, dihydrophthalazine, tetrahydrophthalazine, dihydronaphthyridine, tetrahydronaphthyridine, di-
 60 hydroquinoxaline, tetrahydroquinoxaline, dihydroquinazoline, tetrahydroquinazoline, dihydrocinnoline, tetrahydrocin-
 noline, dihydrobenzoxazine, dihydrobenzothiazine, pyrazinomorpholine, dihydrobenzoxazole, dihydrobenzothiazole,
 dihydrobenzimidazole, dihydrobenzazepine, tetrahydrobenzazepine, dihydrobenzodiazepine, tetrahydrobenzodi-

azepine, dihydrobenzoxazepine, tetrahydrobenzoxazepine,



etc.

10 **[0052]** The "6- to 11- membered saturated monocyclic or bicyclic heterocycle" includes, for example, piperidine, piperazine, perhydropyrimidine, perhydropyridazine, perhydroazepine, perhydrodiazepine, perhydroazocine, perhydrooxazepine, perhydrooxadiazepine, tetrahydrothiadiazole (thiadiazolidine), tetrahydrothiazine, tetrahydrothiadiazine, perhydrothiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, perhydroindazole, perhydroquinoline, perhydroisoquinoline, perhydrophthalazine, perhydronaphthyridine, perhydroquinoxaline, perhydroquinazoline, perhydrocinnoline, perhydrobenzoxazole, perhydrobenzothiazole, perhydrobenzimidazole etc. Ring B is more preferably
15 pyridine, quinoline, isoquinoline, pyrimidine, quinazoline, tetrahydroquinazoline,



etc.

25 **[0053]** Ring B may be substituted with 1 to 5 of R^b (R^b has the same meaning as R³ which has the same meanings as described above.).

[0054] The "hydrocarbon group" in the "hydrocarbon group which may have a substituent(s)" represented by Y includes, for example, C1-15 alkyl such as methyl, ethyl, propyl, isopropyl, butyl, isobutyl, s-butyl, t-butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl etc.; C2-10 alkenyl such as vinyl, allyl, 2-methylallyl, 2-butenyl, 3-butenyl, 3-octenyl etc.; C2-10 alkynyl such as ethynyl, 2-propynyl, 3-hexynyl etc.; cyclic hydrocarbon group (the "cyclic hydrocarbon" has the same meaning as "cyclic hydrocarbon" defined with above-mentioned ring B.); C7-16 aralkyl such as benzyl, phenylethyl etc.; (C3-8 cycloalkyl)-(C1-4 alkyl) such as cyclohexylmethyl, cyclohexylethyl, cyclohexylpropyl, 1-methyl-1-cyclohexylmethyl etc.

30 **[0055]** The "substituent" in the "hydrocarbon group which may have a substituent(s)" include, for example, (1) nitro, (2) hydroxy, (3) oxo, (4) thioxo, (5) cyano, (6) carbamoyl, (7) aminocarbonyl substituted by C1-8 hydrocarbon (e.g. N-butylaminocarbonyl, N-cyclohexylmethylaminocarbonyl, N-butyl-N-cyclohexylmethylaminocarbonyl, N-cyclohexylaminocarbonyl, phenylaminocarbonyl etc.), (8) carboxy, (9) C1-4 alkoxy carbonyl such as methoxycarbonyl, ethoxycarbonyl etc., (10) sulfo, (11) halogen such as fluorine, chlorine, bromine or iodine, (12) C1-8 alkoxy such as methoxy, ethoxy, propoxy, isopropoxy, butoxy, isobutoxy, s-butoxy, t-butoxy, cyclohexylmethoxy or benzyloxy etc., (13) C3-8 cycloalkoxy such as cyclohexyloxy etc., (14) phenoxy, (15) halogenophenoxy such as o-, m- or p-chlorophenoxy, or o-, m- or p-bromophenoxy etc., (16) C1-4 lower alkylthio such as methylthio, ethylthio, n-propylthio, isopropylthio, n-butylthio, t-butylthio etc., (17) phenylthio, (18) C1-4 lower alkylsulfinyl such as methylsulfinyl or ethylsulfinyl etc., (19) C1-4 lower alkylsulfonyl such as methylsulfonyl or ethylsulfonyl etc., (20) amino, (21) C1-6 lower acylamino such as acetylamino or propionylamino etc., (22) primary or secondary amine substituted by hydrocarbon group (e.g. methylamino, ethylamino, n-propylamino, isopropylamino, n-butylamino, dimethylamino, diethylamino, cyclohexylamino, 1-carbamoyl-2-cyclohexylethylamino, N-butyl-N-cyclohexylmethylamino or phenylamino etc.), (the "hydrocarbon group" has the same meanings as above "hydrocarbon group" and may be substituted by oxo, amino or carbamoyl etc.), (23) C1-4 lower acyl such as formyl or acetyl etc., (24) benzoyl, (25) 5 or 6 membered hetero cyclic ring group such as 2- or 3-thienyl, 2- or 3-furyl, 3-, 4- or 5-pyrazolyl, 4-tetrahydropyran-2-yl, 2-, 4- or 5-thiazolyl, 3-, 4- or 5-isothiazolyl, 2-, 4- or 5-oxazolyl, 3-, 4- or 5-isoxazolyl, 2-, 4- or 5-imidazolyl, 1,2,3- or 1,2,4-triazolyl, 1H or 2H-tetrazolyl, 2-, 3- or 4-pyridyl, 2-, 4- or 5-pyrimidinyl, 3- or 4-pyridazinyl, quinolyl, isoquinolyl or indolyl etc. which includes 1 to 4 hetero atoms selected from oxygen, sulfur and nitrogen besides carbon atom, and optionally has 1 to 4 substituents selected from (a) e.g. halogen such as fluorine, chlorine, bromine or iodine, (b) hydrocarbon such as methyl, ethyl, propyl, isopropyl, benzyl, cyclohexyl, cyclohexylmethyl or cyclohexylethyl etc. optionally substituted by oxo or hydroxy etc., (the "hydrocarbon group" has the same meanings as above "hydrocarbon group"), (c) halogenophenoxy such as o-, m- or p-chlorophenoxy, or o-, m- or p-bromophenoxy etc., and (d) oxo etc., (26) C1-10 haloalkyl such as difluoromethyl, trifluoromethyl, trifluoroethyl or trichloroethyl etc., (27) hydroxyimino, (28) alkoxyimino such as methoxyimino or ethoxyimino etc., (29) sulfamoyl, (30) aminosulfonyl substituted by hydrocarbon (e.g. methylaminosulfonyl etc.), (31)

aminosulfonyl substituted by hydrocarbon substituted by amino (e.g. dimethylaminoethylaminosulfonyl or dimethylaminopropylaminosulfonyl *etc.*), or (32) sulfonylamino substituted by hydrocarbon (e.g. methylsulfonylamino *etc.*) *etc.* The "hydrocarbon group which may have a substituent(s)" can have 1 to 5 of substituents selected from above (1) to (32). If the "hydrocarbon group" is cycloalkyl, cycloalkenyl, aryl or aralkyl, it may be have 1 to 4 of C1-4 lower alkyl such as methyl, ethyl, propyl, isopropyl or butyl *etc.* as substituent. When the number of substituents is two or more, each substituent may be same or different.

[0056] The "heterocycle" in "heterocyclic group which may have a substituent(s)" represented by Y has the same meaning as "heterocycle" defined in above-mentioned ring B. The "heterocycle" represented by Y may be substituted with 1 to 5 of R³ (R³ has the same meaning as described above.).

[0057] A protecting group of amino group in the "amino group which may be protected" includes, for example, (1) hydrocarbon group which may have a substituent(s), (2) NR^1R^2 (R^1 and R^2 have the same meanings as described above respectively.), (3) ring C optionally substituted with 1 to 5 of R^3 (ring C and R^3 have the same meanings as described above respectively), (4)



(wherein all symbols have the same meanings as described above.) *etc.* The "hydrocarbon group which may have a substituent(s)" as the "protecting group" in the "amino group which may be protected" represented by Y has the same meaning as described above.

[0058] The "protecting group" in the "hydroxyl group which may be protected" or the "mercapto group which may be protected" represented by Y has the same meaning as the "protecting group" in the "amino group which may be protected".

[0059] Preferred as Y is, for example, amino group which may be protected *etc.* More preferred is



(wherein all symbols have the same meanings as described above.).

[0060] The "spacer containing 1 to 3 atoms as a main chain" represented by G means a space formed by 1 to 3 continued atoms. In this case, the "number of atoms as a main chain" should be counted such that atoms as a main chain become minimum. The "spacer having from 1 to 3 atoms as a main chain" include, for example, a bivalent group comprising 1 to 3 selected from methylene (-CH₂-) which may have 1 or 2 of substituents, nitrogen atom (-NH-) which may have some substituents, -CO-, -O-, -S-, -SO- and -SO₂-. In the case, the substituent of methylene and imino have the same meanings as the "substituent" of above-described the "hydrocarbon group which may have a substituent(s)". Specifically, it includes, for example, -CR¹⁰⁴R¹⁰⁵-, -NR¹⁰⁶-, -CO-, -O-, -S-, -NR¹⁰⁶CO-, -CONR¹⁰⁶-, -NR¹⁰⁶COCR¹⁰⁴R¹⁰⁵-, -CONR¹⁰⁶CR¹⁰⁴R¹⁰⁵-. (wherein R¹⁰⁴ - R¹⁰⁶ have the same meaning as the "substituent" of above-described the "hydrocarbon group which may have a substituent(s)".) *etc.*

[0061] Preferred as G is, for example, a bond or spacer containing one atom as a main chain *etc.* More preferred as G is, for example, a bond or methylene.

[0062] The "nitrogen-containing heterocycle" in the "4- to 7-membered nitrogen-containing heterocyclic group which may have a substituent(s)" represented by ring J refers to a monocyclic heterocycle which may contain, in addition to the nitrogen atom indicated in ring J in formula (I), 1 to 3 hetero atoms selected from nitrogen, oxygen and sulfur atoms. The "4- to 7-membered nitrogen-containing heterocycle" includes, for example, a "4- to 7-membered nitrogen-containing unsaturated monocyclic heterocycle", a "4- to 7-membered nitrogen-containing saturated monocyclic heterocycle" and the like.

[0063] The "4- to 7-membered nitrogen-containing unsaturated monocyclic heterocycle" includes, for example, pyrrole, imidazole, triazole, tetrazole, pyrazole, pyrroline, imidazoline, triazoline, tetrazoline, pyrazoline, dihydropyridine, tetrahydropyridine, dihydropyrazine, tetrahydropyrazine, dihydropyrimidine, tetrahydropyrimidine, dihydropyridazine, tetrahydropyridazine, dihydroazepine, tetrahydroazepine, dihydrodiazepine, tetrahydrodiazepine, dihydrooxazole, dihydroisoxazole, dihydrothiazole, dihydroisothiazole, dihydrofuran, dihydrooxadiazole, dihydrooxazine, dihydrooxadiazine, dihydrooxazepine, tetrahydrooxazepine, dihydrooxadiazepine, tetrahydrooxadiazepine, dihydrothiadiazole, dihydrothiazine, dihydrothiadiazine, dihydrothiazepine, tetrahydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine,

azepine ring *etc.*

[0064] "4- to 7-membered nitrogen-containing saturated monocyclic heterocycle" includes, for example, azetidine, pyrrolidine, imidazolidine, triazolidine, tetrazolidine, pyrazolidine, piperidine, piperazine, perhydropyrimidine, perhydropyridazine, perhydroazepine, perhydrodiazepine, tetrahydrooxazole (oxazolidine), tetrahydroisoxazole (isoxazolidine), tetrahydrothiazole (thiazolidine), tetrahydroisothiazole (isothiazolidine), tetrahydrofurazan, tetrahydrooxadiazole (oxadiazolidine), tetrahydrooxazine, tetrahydrooxadiazine, perhydrooxazepine, perhydrooxadiazepine, tetrahydrothiadiazole (thiadiazolidine), tetrahydrothiazine, tetrahydrothiadiazine, perhydrothiazepine, perhydrothiadiazepine, morpholine, thiomorpholine *etc.*

[0065] Preferred as J is, for example, "4- to 7-membered nitrogen-containing saturated monocyclic heterocycle". More preferred as J is, for example, azetidine, pyrrolidine, piperidine or perhydroazepine *etc.*

[0066] Ring J may be substituted with 1 to 5 of R³ (R³ has a same meaning as described above.).

[0067] The "hydrocarbon group which may have a substituent(s)" represented by W has the same meaning as the "hydrocarbon group which may have a substituent(s)" defined in above-mentioned Y.

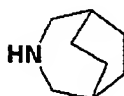
[0068] The "heterocyclic group which may have a substituent(s)" represented by W has the same meaning as the "heterocyclic group which may have a substituent(s)" defined in above-mentioned ring B.

[0069] Preferred as W is, for example, hydrogen atom or C1-8 hydrocarbon group which may have a substituent(s). The "hydrocarbon group" has a same meaning as described above. More preferred as W is, for example, hydrogen atom, methyl, isobutyl, 2-ethylbutyl, cyclohexylmethyl, cyclohexyl, benzyl or tetrahydropyran-4-yl *etc.*

[0070] The "5- to 10-membered nitrogen-containing saturated heterocyclic group which may have a substituent(s), or a 5- to 10-membered nitrogen-containing heterocyclic group which has one double bond and which may have a substituent(s)" represented by ring A¹ in formula (I-1) include a monocyclic or bicyclic heterocycle which is fully saturated or comprising one double bond and which may contain, in addition to the nitrogen atom indicated in ring A¹ in formula (I), 1 to 3 hetero atoms selected from nitrogen, oxygen and sulfur atoms. The "5- to 10-membered nitrogen-containing saturated heterocycle" includes, for example, pyrrolidine, imidazolidine, triazolidine, tetrazolidine, pyrazolidine, piperidine, piperazine, perhydropyrimidine, perhydropyridazine, perhydroazepine, perhydrodiazepine, perhydroazocine, tetrahydrooxazole (oxazolidine), tetrahydroisoxazole (isoxazolidine), tetrahydrothiazole (thiazolidine), tetrahydroisothiazole (isothiazolidine), tetrahydrofurazan, tetrahydrooxadiazole (oxadiazolidine), tetrahydrooxazine, tetrahydrooxadiazine, perhydrooxazepine, perhydrooxadiazepine, tetrahydrothiadiazole (thiadiazolidine), tetrahydrothiazine, tetrahydrothiadiazine, tetrahydrothiazepine, perhydrothiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, perhydroindazole, perhydroquinoline, perhydroisoquinoline, perhydrophthalazine, perhydronaphthyridine, perhydroquinoxaline, perhydroquinazoline, perhydrocinnoline, perhydrobenzoxazole, perhydrobenzothiazole, perhydrobenzimidazole, perhydroazonline, perhydroazecine, perhydrodiazocine, perhydrodiazonline, perhydrodiazecine, perhydroindole, perhydroisoindole, azabicyclo[3.2.2]nonane, azabicyclo[3.3.2]decane, azabicyclo[2.2.2]octane *etc.*

[0071] "5- to 10-membered nitrogen-containing heterocyclic group which has one double bond" includes, for example, pyrroline, imidazoline, triazoline, tetrazoline, pyrazoline, tetrahydropyridine, tetrahydropyrazine, tetrahydropyrimidine, tetrahydropyridazine, tetrahydroazepine, tetrahydrodiazepine, dihydrooxazole, dihydroisoxazole, dihydrothiazole, dihydroisothiazole, dihydrofurazan, dihydrooxadiazole, dihydrooxazine, dihydrooxadiazine, tetrahydrooxazepine, tetrahydrooxadiazepine, dihydrothiadiazole, dihydrothiazine, dihydrothiadiazine, tetrahydrothiazepine, tetrahydrothiadiazepine, hexahydroazocine, hexahydroazonine, hexahydrodiazocine, hexahydrodiazonline, octahydroazecine, octahydrodiazecine *etc.*

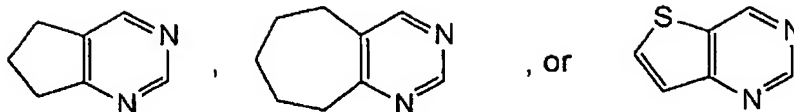
[0072] Preferred as ring A¹ is, for example, 5- to 10- membered nitrogen-containing saturated heterocycle *etc.* More preferred is, for example, perhydroazepine, perhydroazocine, piperidine or



etc.

[0073] Ring A¹ may be substituted with 1 to 5 of R^a (R^a has a same meaning as R³, which has a same meaning as described above.).

[0074] The "6- to 11-membered nitrogen-containing monocyclic or bicyclic heterocycle" has a same meaning as described above. Preferred as ring B¹ is, for example, pyridine, quinoline, isoquinoline, pyrimidine, quinazoline, tetrahydroquinazoline,



etc.

[0075] Ring B¹ may be substituted with 1 to 5 of R^b (R^b has a same meaning as R³, which has a same meaning as described above.).

[0076] In formula (1-3) of the present invention, the 4- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom represented by ring A² includes 4- to 15- membered monocyclic, bicyclic or tricyclic heterocyclic aryl which may be partially or fully saturated and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom.

[0077] The 4- to 15- membered monocyclic, bicyclic or tricyclic heterocyclic aryl which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom includes, for example, pyrrole, imidazole, triazole, tetrazole, pyrazole, azepine, diazepine, indole, isoindole, indazole, purine, benzimidazole, benzotriazole, carbazole, β -carboline, phenothiazine, phenoxazine, perimidine etc.

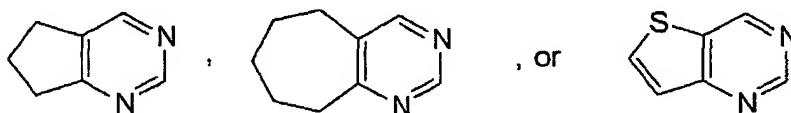
[0078] The 4- to 15- membered monocyclic, bicyclic or tricyclic heterocyclic aryl which is partially or fully saturated and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom includes, for example, aziridine, azetidine, pyrroline, pyrrolidine, imidazoline, imidazolidine, triazoline, triazolidine, tetrazoline, tetrazolidine, pyrazoline, pyrazolidine, dihydropyridine, tetrahydropyridine, piperidine, dihydropyrazine, tetrahydropyrazine, piperazine, dihydropyrimidine, tetrahydropyrimidine, perhydropyrimidine, dihydropyridazine, tetrahydropyridazine, perhydropyridazine, dihydroazepine, tetrahydroazepine, perhydroazepine, perhydroazocine, dihydrodiazepine, tetrahydrodiazepine, perhydrodiazepine, dihydrooxazole, tetrahydrooxazole (oxazolidine), dihydroisoxazole, tetrahydroisoxazole (isoxazolidine), dihydrothiazole, tetrahydrothiazole (thiazolidine), dihydroisothiazole, tetrahydroisothiazole (isothiazolidine), dihydrofurazan, tetrahydrofurazan, dihydrooxadiazole, tetrahydrooxadiazole (oxadiazolidine), dihydrooxazine, tetrahydrooxazine, dihydrooxadiazine, tetrahydrooxadiazine, dihydrooxazepine, tetrahydrooxazepine, perhydrooxazepine, dihydrooxadiazepine, tetrahydrooxadiazepine, perhydrooxadiazepine, dihydrothiadiazole, tetrahydrothiadiazole (thiadiazolidine), dihydrothiazine, tetrahydrothiazine, dihydrothiadiazine, tetrahydrothiadiazine, dihydrothiazepine, tetrahydrothiazepine, perhydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, indoline, isoindoline, dihydroindazole, perhydroindazole, dihydroquinoline, tetrahydroquinoline, perhydroquinoline, dihydroisoquinoline, tetrahydroisoquinoline, perhydroisoquinoline, dihydropthalazine, tetrahydropthalazine, perhydropthalazine, dihydronaphthyridine, tetrahydronaphthyridine, perhydronaphthyridine, dihydroquinoxaline, tetrahydroquinoxaline, perhydroquinoxaline, dihydroquinazoline, tetrahydroquinazoline, perhydroquinazoline, dihydrocinnoline, tetrahydrocinnoline, perhydrocinnoline, dihydrobenzoxazine, dihydrobenzothiazine, pyrazinomorpholine, dihydrobenzoxazole, perhydrobenzoxazole, dihydrobenzothiazole, perhydrobenzothiazole, dihydrobenzimidazole, perhydrobenzimidazole, dihydrobenzazepine, tetrahydrobenzazepine, dihydrobenzodiazepine, tetrahydrobenzodiazepine, dihydrobenzoxazepine, tetrahydrobenzoxazepine, dihydrocarbazole, tetrahydrocarbazole, perhydrocarbazole, dihydroacridine, tetrahydroacridine, perhydroacridine, hexahydroazocine, hexahydroazonine, hexahydrodiazocine, hexahydrodiazonine, octahydroazecine, octahydrodiazecine, perhydroazonine, perhydroazecine, azaundecane, azadodecane, azatridecane, azatetradecane, azapentadecane, perhydrodiazocine, perhydrodiazonine, perhydrodiazecine, diazaundecane, diazadodecane, diazatridecane, diazatetradecane, diazapentadecane, perhydroindole, perhydroisoindole, perhydro-beta-carboline, perhydrophenazine, perhydrophenothiazine, perhydrophenoxazine, perhydrophenanthridine, perhydrophenanthrodine, perhydroperimidine etc.

[0079] In formula (1-3) in the present invention, the 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom represented by ring B² includes a 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic aryl which may be partially or fully saturated and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom.

[0080] The 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic aryl which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom includes, for example, pyrrole, imidazole, triazole, tetrazole, pyrazole, pyridine, pyrazine, pyrimidine, pyridazine, triazine, azepine, diazepine, oxazole, isoxazole, thiazole, isothiazole, furazan, oxadiazole, oxazine, oxadiazine, oxazepine, oxadiazepine, thiadiazole, thiazine, thiadiazine, thiazepine, thiadiazepine, indole, isoindole, indolizine, indazole, quinoline, isoquinoline, quinolizine, purine, phthalazine, pteridine, naphthyridine, quinoxaline, quinazoline, cinnoline, benzoxazole, benzothiazole, benzimidazole, benzoxazepine, benzoxadiazepine, benzothiazepine, benzothiadiazepine, benzazepine, benzodi-

azepine, benzofurazan, benzothiadiazole, benzotriazole, carbazole, beta-carboline, acridine, phenazine, phenothiazine, phenoxazine, phenanthridine, phenanthroline, perimidine *etc.*

[0081] The 5- to 5-membered monocyclic, bicyclic or tricyclic heterocyclic aryl which is partially or fully saturated and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom includes, for example, pyrroline, pyrrolidine, imidazoline, imidazolidine, triazoline, triazolidine, tetrazoline, tetrazolidine, pyrazoline, pyrazolidine, dihydropyridine, tetrahydropyridine, piperidine, dihydropyrazine, tetrahydropyrazine, piperazine, dihydropyrimidine, tetrahydropyrimidine, perhydropyrimidine, dihydropyridazine, tetrahydropyridazine, perhydropyridazine, tetrahydrotriazine, dihydroazepine, tetrahydroazepine, perhydroazepine, dihydrodiazepine, tetrahydrodiazepine, perhydrodiazepine, dihydrooxazole, tetrahydrooxazole (oxazolidine), dihydroisoxazole, tetrahydroisoxazole (isoxazolidine), dihydrothiazole, tetrahydrothiazole (thiazolidine), dihydroisothiazole, tetrahydroisothiazole (isothiazolidine), dihydrofurazan, tetrahydrofurazan, dihydrooxadiazole, tetrahydrooxadiazole (oxadiazolidine), dihydrooxazine, tetrahydrooxazine, dihydrooxadiazine, tetrahydrooxadiazine, dihydrooxazepine, dihydrooxazepine, perhydrooxazepine, dihydrooxadiazepine, tetrahydrooxadiazepine, perhydrooxadiazepine, dihydrothiadiazole, tetrahydrothiadiazole (thiadiazolidine), dihydrothiazine, tetrahydrothiazine, dihydrothiadiazine, tetrahydrothiadiazine, dihydrothiazepine, perhydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, indoline, isoindoline, dihydroindazole, perhydroindazole, dihydroquinoline, tetrahydroquinoline, perhydroquinoline, dihydroisoquinoline, tetrahydroisoquinoline, perhydroisoquinoline, dihydronaphthalazine, tetrahydronaphthalazine, perhydronaphthalazine, dihydronaphthyridine, tetrahydronaphthyridine, perhydronaphthyridine, dihydroquinoxaline, tetrahydroquinoxaline, perhydroquinoxaline, dihydroquinazoline, tetrahydroquinazoline, perhydroquinazoline, dihydrocinnoline, tetrahydrocinnoline, perhydrocinnoline, dihydrobenzoxazine, dihydrobenzothiazine, pyrazinomorpholine, dihydrobenzoxazole, perhydrobenzoxazole, dihydrobenzothiazole, perhydrobenzothiazole, dihydrobenzimidazole, perhydrobenzimidazole, dihydrobenzazepine, tetrahydrobenzazepine, dihydrobenzodiazepine, tetrahydrobenzodiazepine, dihydrobenzoxazepine, tetrahydrobenzoxazepine, dihydrocarbazole, tetrahydrocarbazole, perhydrocarbazole, dihydro-beta-carboline, tetrahydro-beta-carboline, perhydro-beta-carboline, dihydroacridine, tetrahydroacridine, perhydroacridine, 6,7,8,9-tetrahydro-5H-pyrido[4',3':4,5]pyrrolo[2,3-b]pyridine, 2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole, 6,7,8,9-tetrahydro-5H-pyrido[3',4':4,5]pyrrolo[2,3-b]pyridine,



etc.

[0082] In formula (I-A) of the present invention, 4- to 15-membered monocyclic, bicyclic or tricyclic heterocycle which is saturated or has one double bond and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom by ring A^A includes, for example, azetidene, pyrroline, pyrrolidine, imidazoline, imidazolidine, triazoline, triazolidine, tetrazoline, tetrazolidine, pyrazoline, pyrazolidine, tetrahydropyridine, piperidine, tetrahydropyrazine, piperazine, tetrahydropyrimidine, perhydropyrimidine, tetrahydropyridazine, perhydropyridazine, tetrahydroazepine, perhydroazepine, tetrahydrodiazepine, perhydroazocine, perhydrodiazepine, dihydrooxazole, tetrahydrooxazole (oxazolidine), dihydroisoxazole, tetrahydroisoxazole (isoxazolidine), dihydrothiazole, tetrahydrothiazole (thiazolidine), dihydroisothiazole, tetrahydroisothiazole (isothiazolidine), dihydrofurazan, tetrahydrofurazan, dihydrooxadiazole, tetrahydrooxadiazole (oxadiazolidine), dihydrooxazine, tetrahydrooxazine, dihydrooxadiazine, tetrahydrooxadiazine, tetrahydrooxazepine, perhydrooxazepine, tetrahydrooxadiazepine, perhydrooxadiazepine, dihydrothiadiazole, tetrahydrothiadiazole (thiadiazolidine), dihydrothiazine, tetrahydrothiazine, dihydrothiadiazine, tetrahydrothiadiazine, tetrahydrothiazepine, perhydrothiazepine, tetrahydrothiadiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, perhydroindazole, perhydroquinoline, perhydroisoquinoline, perhydronaphthalazine, perhydronaphthyridine, perhydroquinoxaline, perhydroquinazoline, perhydrocinnoline, perhydrobenzoxazole, perhydrobenzothiazole, perhydrobenzimidazole, perhydrocarbazole, perhydroacridine, hexahydroazocine, hexahydroazonine, hexahydrodiazocine, hexahydrodiazonine, octahydroazecine, octahydrodiazecine, perhydroazonine, perhydroazecine, azaundecane, azadodecane, azatridecane, azatetradecane, azapentadecane, perhydrodiazocine, perhydrodiazonine, perhydrodiazecine, diazaundecane, diazadodecane, diazatridecane, diazatetradecane, diazapentadecane, perhydroindole, perhydroisoindole, perhydro-beta-carboline, perhydrophenazine, perhydrophenothiadine, perhydrophenoxadine, perhydrophenanthridine, perhydrophenanthroline, perhydroperimidine *etc.*

[0083] In formula (I-B) of the present invention, 7- to 15-membered monocyclic, bicyclic or tricyclic heterocycle which is saturated or contains one double bond and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom represented by ring A^B includes, for example, tetrahy-

droazepine, perhydroazepine, tetrahydrodiazepine, perhydrodiazepine, perhydroazocine, tetrahydrooxazepine, perhydrooxazepine, tetrahydrooxadiazepine, perhydrooxadiazepine, tetrahydrothiazepine, perhydrothiazepine, tetrahydrothiadiazepine, perhydrothiadiazepine, perhydroindazole, perhydroquinoline, perhydroisoquinoline, perhydrophthalazine, perhydronaphthyridine, perhydroquinoxaline, perhydroquinazoline, perhydrocinnoline, perhydrobenzoxazole, perhydrobenzothiazole, perhydrobenzimidazole, perhydrocarbazole, perhydroacridine, hexahydroazocine, hexahydroazonine, hexahydrodiazocine, hexahydrodiazonine, octahydroazecine, octahydrodiazecine, perhydroazonine, perhydroazecine, azaundecane, azadodecane, azatridecane, azatetradecane, azapentadecane, perhydrodiazocine, perhydrodiazonine, perhydrodiazecine, diazaundecane, diazadodecane, diazatrdecane, diazatetradecane, diazapentadecane, perhydroindole, perhydroisindole, perhydro-beta-carboline, perhydrophenazine, perhydrophenothiadine, perhydrophenoxadine, perhydrophenanthridine, perhydrophenanthroline, perhydroperimidine *etc.*

[0084] The bicyclic heterocycle represented by above-described A² in formula (I-3), A^A in formula (I-A) or A^B in formula (I-B) includes a bridged bicyclic heterocycle. The bridged bicyclic heterocycle includes, for example, azabicyclo[3.2.2]nonane, azabicyclo[3.3.2]decane, azabicyclo[2.2.2]octane, azabicyclo[3.3.3]undecane, azabicyclo[4.3.3]dodecane, azabicyclo[4.4.3]tridecane, azabicyclo[4.4.4]tetradecane *etc.* The bridged bi-heterocyclic ring may have one double bond.

[0085] In formula (I-B) of the present invention, ring B^B is pyrimidine or 1,3,5-triazine that may be fused with ring Z.

[0086] In the present invention, the C5-10 monocyclic or bicyclic carbocycle represented by ring Z includes, for example, cyclopentene, cyclohexene, cycloheptene, cyclooctene, cyclononene, cyclodecene, cyclopentadiene, cyclohexadiene, cycloheptadiene, cyclooctadiene, benzene, pentalene, azulene, indene, indan, naphthalene, dihydronaphthalene, tetrahydronaphthalene *etc.*

[0087] In the present invention, the 5- to 10-membered monocyclic or bicyclic heterocycle which may contain 1 or 2 nitrogen atoms, one oxygen atom and/or one sulfur atom represented by ring Z includes a 5- to 10-membered mono- or bi-heterocyclic aryl which may be partially saturated and which may contain 1 or 2 nitrogen atoms, one oxygen atom and/or one sulfur atom.

[0088] The 5- to 10-membered mono- or bi-heterocyclic aryl which may contain 1 or 2 nitrogen atoms, one oxygen atom and/or one sulfur atom includes, for example, pyrrole, imidazole, triazole, pyrazole, pyridine, pyrazine, pyrimidine, pyridazine, azepine, diazepine, furan, pyran, oxepine, thiophene, thiopyran, thiepine, oxazole, isoxazole, thiazole, isothiazole, furazan, oxadiazole, oxazine, oxadiazine, oxazepine, oxadiazepine, thiadiazole, thiazine, thiadiazine, thiazepine, thiadiazepine, indole, isoindole, indolizine, benzofuran, isobenzofuran, benzothiophene, isobenzothiophene, dithianaphthalene, indazole, quinoline, isoquinoline, quinolizine, purine, phthalazine, pteridine, naphthyridine, quinoxaline, quinazoline, cinnoline, benzoxazole, benzothiazole, benzimidazole, chromene, benzofurazan, benzothiadiazole, benzotriazole ring *etc.*

[0089] The 5- to 10-membered mono- or bi-heterocyclic aryl which is partially saturated and which may contain 1 or 2 nitrogen atoms, one oxygen atom and/or one sulfur atom includes, for example, pyrroline, imidazoline, pyrazoline, dihydropyridine, tetrahydropyridine, dihydropyrazine, tetrahydropyrazine, dihydropyrimidine, tetrahydropyrimidine, dihydropyridazine, tetrahydropyridazine, dihydroazepine, tetrahydroazepine, dihydrodiazepine, tetrahydrodiazepine, dihydrofuran, dihydropyran, dihydrooxepine, tetrahydrooxepine, dihydrothiophene, dihydrothiopyran, dihydrothiepine, tetrahydrothiepine, dihydrooxazole, dihydroisoxazole, dihydrothiazole, dihydroisothiazole, dihydrofurazan, dihydrooxadiazole, dihydrooxazine, dihydrooxadiazine, dihydrooxazepine, tetrahydrooxazepine, dihydrooxadiazepine, tetrahydrooxadiazepine, dihydrothiadiazole, dihydrothiazine, dihydrothiadiazine, dihydrothiazepine, tetrahydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine, dihydrooxazine, dihydrothiazine, oxathiane, indoline, isoindoline, dihydrobenzofuran, dihydroisobenzofuran, dihydrobenzothiophene, dihydroisobenzothiophene, dihydroindazole, dihydroquinoline, tetrahydroquinoline, dihydroisoquinoline, tetrahydroisoquinoline, dihydrophthalazine, tetrahydrophthalazine, dihydronaphthyridine, tetrahydronaphthyridine, dihydroquinoxaline, tetrahydroquinoxaline, dihydroquinazoline, tetrahydroquinazoline, dihydrocinnoline, tetrahydrocinnoline, benzoxathiane, dihydrobenzoxazine, dihydrobenzothiazine, pyrazinomorpholine, dihydrobenzoxazole, dihydrobenzothiazole, dihydrobenzimidazole, dioxaindan, benzodioxane, chroman, benzodithiolane, benzodithiane *etc.*

[0090] In the present invention, C1-8 alkylene represented by L means methylene, ethylene, propylene, butylene, pentylene, hexylene, heptylene, octylene or isomeric groups thereof.

[0091] In the present invention, C2-8 alkenylene represented by L means ethylene, propylene, butylene, pentylene, hexylene, heptylene, octylene and isomeric groups thereof having one or two double bond(s), concretely, ethenylene, propenylene, butenylene, pentenylene, hexenylene, heptenylene, octenylene, hexadienylene, heptadienylene, octadienylene or isomeric groups thereof

[0092] In the present invention, C2-8 alkynylene represented by L means ethylene, propylene, butylene, pentylene, hexylene, heptylene, octylene and isomeric groups thereof having one triple bond, concretely, ethynylene, propynylene, butynylene, pentynylene, hexynylene, heptynylene, octynylene or isomeric groups thereof.

[0093] In the present invention, C3-8 carbocycle represented by L, R¹, R² and R⁴ means C3-8 monocyclic or bridged bicyclic carbocycle, for example, cyclopropane, cyclobutane, cyclopentane, cyclohexane, cycloheptane, cyclooctane,

cyclopentene, cyclohexene, cycloheptene, cyclooctene, cyclopentadiene, cyclohexadiene, cycloheptadiene, cyclooctadiene, benzene, bicyclo[2.2.1]heptane, bicyclo[2.2.2]octane *etc.*

[0094] In the present invention, C1-15 alkyl means methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl or isomeric groups thereof.

[0095] In the present invention, C2-15 alkenyl means ethenyl, propenyl, butenyl, pentenyl, hexenyl, heptenyl, octenyl, nonenyl, decenyl, undecenyl, dodecenyl, tridecenyl, tetradecenyl, pentadecenyl or isomeric groups thereof

[0096] In the present invention, C2-15 alkynyl means ethynyl, propynyl, butynyl, pentynyl, hexynyl, heptynyl, octynyl, nonynyl, decynyl, undecynyl, dodecynyl, tridecynyl, tetradecynyl, pentadecynyl or isomeric groups thereof.

[0097] In the present invention, the 4- to 15-membered heterocycle which contains at least one nitrogen atom and may further contain 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom represented by ring C includes a 4- to 15-membered heterocyclic aryl which may be partially or fully saturated and which contains at least one nitrogen atom and may further contain 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom.

[0098] The 4- to 15-membered heterocyclic aryl which contains at least one nitrogen atom and may further contain 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom includes, for example, pyrrole, imidazole, triazole, pyrazole, pyridine, pyrazine, pyrimidine, pyridazine, azepine, diazepine, oxazole, isoxazole, thiazole, isothiazole, furazan, oxadiazole, oxazine, oxadiazine, oxazepine, oxadiazepine, thiadiazole, thiazine, thiadiazine, thiazepine, thiadiazepine, indole, isoindole, indolizine, indazole, quinoline, isoquinoline, quinolizine, phthalazine, naphthyridine, quinoxaline, quinazoline, cinnoline, benzoxazole, benzothiazole, benzimidazole, benzoxazepine, benzoxadiazepine, benzothiazepine, benzothiadiazepine, benzazepine, benzodiazepine, benzofurazan, benzothiadiazole, benzotriazole, carbazole, beta-carboline, acridine, phenazine, xanthene, phenothiazine, phenoxazine, phenoxathiin, phenanthridine, phenanthroline, perimidine *etc.*

[0099] The 4- to 15-membered heterocyclic aryl which is partially or fully saturated and which contains at least one nitrogen atom and may further contain 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom includes, for example, azetidione, pyrrolidine, pyrrolidine, imidazoline, imidazolidine, triazoline, triazolidine, tetrazoline, tetrazolidine, pyrazoline, pyrazolidine, dihydropyridine, tetrahydropyridine, piperidine, dihydropyrazine, tetrahydropyrazine, piperazine, dihydropyrimidine, tetrahydropyrimidine, perhydropyrimidine, dihydropyridazine, tetrahydropyridazine, perhydropyridazine, dihydroazepine, tetrahydroazepine, perhydroazepine, perhydroazocine, dihydrodiazepine, tetrahydrodiazepine, perhydrodiazepine, dihydrooxazole, tetrahydrooxazole (oxazolidine), dihydroisoxazole, tetrahydroisoxazole (isoxazolidine), dihydrothiazole, tetrahydrothiazole (thiazolidine), dihydroisothiazole, tetrahydroisothiazole (isothiazolidine), dihydrofurazan, tetrahydrofurazan, dihydrooxadiazole, tetrahydrooxadiazole (oxadiazolidine), dihydrooxazine, tetrahydrooxazine, dihydrooxadiazine, tetrahydrooxadiazine, dihydrooxazepine, tetrahydrooxazepine, perhydrooxazepine, dihydrooxadiazepine, tetrahydrooxadiazepine, perhydrooxadiazepine, dihydrothiadiazole, tetrahydrothiadiazole (thiadiazolidine), dihydrothiazine, tetrahydrothiazine, dihydrothiadiazine, tetrahydrothiadiazine, dihydrothiazepine, tetrahydrothiazepine, perhydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, oxathiane, indoline, isoindoline, dihydroindazole, perhydroindazole, dihydroquinoline, tetrahydroquinoline, perhydroquinoline, dihydroisoquinoline, tetrahydroisoquinoline, perhydroisoquinoline, dihydrophthalazine, tetrahydrophthalazine, perhydrophthalazine, dihydronaphthyridine, tetrahydronaphthyridine, perhydronaphthyridine, dihydroquinoxaline, tetrahydroquinoxaline, perhydroquinoxaline, dihydroquinazoline, tetrahydroquinazoline, perhydroquinazoline, dihydrocinnoline, tetrahydrocinnoline, perhydrocinnoline, benzoxathiane, dihydrobenzoxazine, dihydrobenzothiazine, pyrazinomorpholine, dihydrobenzoxazole, perhydrobenzoxazole, dihydrobenzothiazole, perhydrobenzathiazole, dihydrobenzimidazole, perhydrobenzimidazole, dihydrobenzazepine, tetrahydrobenzazepine, dihydrobenzodiazepine, tetrahydrobenzodiazepine, benzodioxepane, dihydrobenzoxazepine, tetrahydrobenzoxazepine, dihydrocarbazole, tetrahydrocarbazole, perhydrocarbazole, dihydroacridine, tetrahydroacridine, perhydroacridine, hexahydroazocine, hexahydroazonine, hexahydrodiazocine, hexahydrodiazonine, octahydroazecine, octahydrodiazecine, perhydroazonine, perhydroazecine, azaundecane, azadodecane, azatridecane, azatetradecane, azapentadecane, perhydrodiazocine, perhydrodiazonine, perhydrodiazecine, diazaundecane, diazadodecane, diazatridecane, diazatetradecane, diazapentadecane, perhydroindole, perhydroisoindole, perhydro-beta-carboline, perhydrophenazine, perhydrophenothiazine, perhydrophenoxazine, perhydrophenanthridine, perhydrophenanthrodine, perhydroperimidine *etc.*

[0100] In the present invention, the 5- to 15-membered monocyclic, bicyclic or tricyclic heterocycle which contains 1 to 4 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom represented by ring D and E includes a 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic aryl which may be partially or fully saturated and which contains 1 to 4 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom. The 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic aryl which contains 1 to 4 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom includes, for example, pyrrole, imidazole, triazole, tetrazole, pyrazole, pyridine, pyrazine, pyrimidine, pyridazine, azepine, diazepine, furan, pyran, oxepine, thiophene, thiopyran, thiepine, oxazole, isoxazole, thiazole, isothiazole, furazan, oxadiazole, oxazine, oxadiazine, oxazepine, oxadiazepine, thiadiazole, thiazine, thiadiazine, thiazepine, thiadiazepine, indole, isoindole, indolizine, benzofuran, isobenzofuran, benzothiophene, isobenzothiophene, dithianaph-

thalene, indazole, quinoline, isoquinoline, quinolizine, purine, phthalazine, pteridine, naphthyridine, quinoxaline, quinoxaline, cinnoline, benzoxazole, benzothiazole, benzimidazole, chromene, benzoxepine, benzoxazepine, benzoxadiazepine, benzothiepine, benzothiazepine, benzothiadiazepine, benzazepine, benzodiazepine, benzofurazan, benzothiadiazole, benzotriazole, carbazole, beta-carboline, acridine, phenazine, dibenzofuran, xanthene, dibenzothiophene, phenothiazine, phenoxazine, phenoxathiin, thianthrene, phenanthridine, phenanthroline, perimidine *etc.*

[0101] The 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic aryl which is partially or fully saturated and which contains 1 to 4 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom includes, for example, pyrroline, pyrrolidine, imidazoline, imidazolidine, triazoline, triazolidine, tetrazoline, tetrazolidine, pyrazoline, pyrazolidine, dihydropyridine, tetrahydropyridine, piperidine, dihydropyrazine, tetrahydropyrazine, piperazine, dihydropyrimidine, tetrahydropyrimidine, perhydropyrimidine, dihydropyridazine, tetrahydropyridazine, perhydropyridazine, dihydroazepine, tetrahydroazepine, perhydroazepine, dihydrodiazepine, tetrahydrodiazepine, perhydrodiazepine, dihydrooxazole, tetrahydrooxazole (oxazolidine), dihydroisoxazole, tetrahydroisoxazole (isoxazolidine), dihydrothiazole, tetrahydrothiazole (thiazolidine), dihydroisothiazole, tetrahydroisothiazole (isothiazolidine), dihydrofurazan, tetrahydrofurazan, dihydrooxadiazole, tetrahydrooxadiazole (oxadiazolidine), dihydrooxazine, tetrahydrooxazine, dihydrooxadiazine, tetrahydrooxadiazine, dihydrooxazepine, tetrahydrooxazepine, perhydrooxazepine, dihydrooxadiazepine, tetrahydrooxadiazepine, perhydrooxadiazepine, dihydrothiadiazole, tetrahydrothiadiazole (thiadiazolidine), dihydrothiazine, tetrahydrothiazine, dihydrothiadiazine, tetrahydrothiadiazine, dihydrothiazepine, tetrahydrothiazepine, perhydrothiazepine, dihydrothiadiazepine, tetrahydrothiadiazepine, perhydrothiadiazepine, morpholine, thiomorpholine, oxathiane, indoline, isoindoline, dihydroindazole, perhydroindazole, dihydroquinoline, tetrahydroquinoline, perhydroquinoline, dihydroisoquinoline, tetrahydroisoquinoline, perhydroisoquinoline, dihydropthalazine, tetrahydropthalazine, perhydropthalazine, dihydronaphthyridine, tetrahydronaphthyridine, perhydronaphthyridine, dihydroquinoxaline, tetrahydroquinoxaline, perhydroquinoxaline, dihydroquinazoline, tetrahydroquinazoline, perhydroquinazoline, dihydrocinnoline, tetrahydrocinnoline, perhydrocinnoline, benzoxathiane, dihydrobenzoxazine, dihydrobenzothiazine, pyrazinomorpholine, dihydrobenzoxazole, perhydrobenzoxazole, dihydrobenzothiazole, perhydrobenzothiazole, dihydrobenzimidazole, perhydrobenzimidazole, dihydrobenzazepine, tetrahydrobenzazepine, dihydrobenzodiazepine, tetrahydrobenzodiazepine, benzodioxepane, dihydrobenzoxazepine, tetrahydrobenzoxazepine, dihydrocarbazole, tetrahydrocarbazole, perhydrocarbazole, dihydroacridine, tetrahydroacridine, perhydroacridine ring *etc.*

[0102] In the present invention, C3-15 monocyclic, bicyclic or tricyclic carbocycle represented by ring D and ring E includes C3-15 monocyclic, bicyclic or tricyclic carbocyclic aryl which may be saturated partially or fully, bicyclic heterocycle having spiro bond and bridged bicyclic heterocycle, for example, cyclopropane, cyclobutane, cyclopentane, cyclohexane, cycloheptane, cyclooctane, cyclononane, cyclodecane, cycloundecane, cyclododecane, cyclotridecane, cyclotetradecane, cyclopentadecane, cyclopentene, cyclohexene, cycloheptene, cyclooctene, cyclopentadiene, cyclohexadiene, cycloheptadiene, cyclooctadiene, benzene, pentalene, perhydropentalene, azulene, perhydroazulene, indene, perhydroindene, indan, naphthalene, dihydronaphthalene, tetrahydronaphthalene, perhydronaphthalene, heptalene, perhydroheptalene, biphenylene, as-indacene, s-indacene, acenaphthylene, acenaphthene, fluorene, phenalene, phenanthrene, anthracene, spiro[4.4]nonane, spiro[4.5]decane, spiro[5.5]undecane, bicyclo[2.2.1]heptane, bicyclo[2.2.1]hept-2-ene, bicyclo[3.1.1]heptane, bicyclo[3.1.1]hept-2-ene, bicyclo[2.2.2]octane, bicyclo[2.2.2]oct-2-ene, adamantane, noradamantane ring *etc.*

[0103] In the present invention, C1-15 alkoxy which is the substituent of ring E means methoxy, ethoxy, propoxy, butoxy, pentyloxy, hexyloxy, heptyloxy, octyloxy, nonyloxy, decyloxy, undecyloxy, dodecyloxy, tridecyloxy, tetradecyloxy, pentadecyloxy and isomeric groups thereof.

[0104] In the present invention, mono(C1-8 alkyl)amino group which is the substituent of ring E means methylamino, ethylamino, propylamino, butylamino, pentylamino, hexylamino, heptylamino, octylamino and isomeric groups thereof.

[0105] In the present invention, di(C1-8 alkyl)amino group which is the substituent of ring E means amino group substituted by same or different two C1-8 alkyl, for example, dimethylamino, diethylamino, dipropylamino, dibutylamino, dipentylamino, dihexylamino, diheptylamino, dioctylamino, ethylmethylamino, ethylpropylamino, methylpropylamino and isomeric groups thereof.

[0106] The "hydrocarbon group which may have substituent(s)" represented by R¹⁰¹ and R¹⁰² has the same meaning as the "hydrocarbon group which may have substituent(s)" defined in Y.

[0107] In the present invention, halogen atom is fluorine, chlorine, bromine and iodine.





[0108] In the present invention, the CXCR4-regulating agent includes, as a matter of course, an agonist and an antagonist. The agonist includes a full agonist, partial agonist and inverse agonist, while the antagonist includes a full antagonist and partial antagonist.

[0109] Also, in the present invention, the CXCR4-regulating agent may be any compound which has an affinity for CXCR4 by itself or in combination with a CXCR4 ligand (for example, SDF-1, gp120 and the like) or with HIV and which may have either an agonistic or antagonistic effect.

[0110] Thus, as used herein, the CXCR4-regulating agent may be any compound capable of inhibiting the binding between CXCR4 and an intrinsic ligand (for example, SDF-1) or HIV. Therefore, it may be an agonist or antagonist,

preferably antagonist.

[0111] Unless otherwise specifically mentioned, all isomers are included in the present invention. For example, alkyl, alkoxy and alkylene include straight chain and branched ones. Moreover, all of isomers due to double bond, ring and fused ring (E-, Z-, cis- and trans-forms), isomers due to presence of asymmetric carbon(s), *etc.* (R-, S-, α - and β -configuration, enantiomer and diastereomer), optically active substances having optical rotation (D-, L-, d- and l-forms), polar compound by chromatographic separation (high-polar compound and low-polar compound), equilibrium compounds, rotational isomers, a mixture thereof in any proportion and a racemic mixture are included in the present invention.

[0112] According to the present invention, unless otherwise indicated and as is apparent for those skilled in the art, symbol  indicates that it is bound to the opposite side of the sheet (namely α -configuration), symbol  indicates that it is bound to the front side of the sheet (namely β -configuration), symbol  indicates that it is α -configuration, β -configuration or a mixture thereof, and symbol  indicates that it is a mixture of α -configuration and β -configuration.

[0113] The compound of the present invention can be converted into a salt by known methods.

[0114] The salt is preferably water-soluble.

[0115] The salt of the present invention are, for example, salt with alkaline metal (such as potassium, sodium and lithium), salt with alkaline earth metal (such as calcium and magnesium), ammonium salt (such as tetramethylammonium salt and tetrabutylammonium salt), salt with organic amine (such as triethylamine, methylamine, dimethylamine, cyclopentylamine, benzylamine, phenethylamine, piperidine, monoethanolamine, diethanolamine, tris(hydroxymethyl) methylamine, lysine, arginine and N-methyl-D-glucamine) and acid addition salt (such as inorganic acid salt (e.g., hydrochloride, hydrobromide, hydroiodide, sulfate, phosphate and nitrate) and organic acid salt (e.g., acetate, trifluoroacetate, lactate, tartrate, oxalate, fumarate, maleate, benzoate, citrate, methanesulfonate, ethanesulfonate, benzenesulfonate, toluenesulfonate, isothionate, glucuronate and gluconate), *etc.*).

[0116] N-oxide means a compound of formula (I) which nitrogen is oxidized. The compounds of the present invention can be converted to N-oxide by arbitrary methods. Salt and N-oxide of the compound of the present invention include solvate, or solvate of salt with alkaline (earth) metal, of ammonium salt, of salt with organic amine and of acid addition salt, of the compound of the present invention.

[0117] The solvate is preferably non toxic and water-soluble. The suitable solvate is, for example, solvate of water or alcohol (e.g. ethanol).

[0118] A prodrug of the compound of formula (I) means a compound which is converted to the compound of formula (I) by reaction with an enzyme, gastric acid or the like in the living body. For example, with regard to a prodrug of the compound of formula (I), when the compound of formula (I) has an amino group, compounds in which the amino group is, for example, acylated, alkylated or phosphorylated (e.g., compounds in which the amino group of the compound of formula (I) is eicosanoylated, alanylated, pentylaminocarbonylated, (5-methyl-2-oxo-1,3-dioxolen-4-yl)methoxycarbonylated, tetrahydrofuranylated, pyrrolidylmethylated, pivaloyloxymethylated, acetoxymethylated, tert-butylated, *etc.*); when the compound of formula (I) has a hydroxyl group, compounds where the hydroxyl group is, for example, acylated, alkylated, phosphorylated or borated (e.g., compounds in which the hydroxyl group of the compound of formula (I) is acetylated, palmitoylated, propanoylated, pivaloylated, succinylated, fumarylated, alanylated or dimethylaminomethylcarbonylated); and that the carboxyl group of the compound of formula (I) is, for example, esterified or amidated (e.g., compounds in which the carboxyl group of the compound of formula (I) is made into ethyl ester, phenyl ester, phenylethyl ester, carboxymethyl ester, dimethylaminomethyl ester, pivaloyloxymethyl ester, ethoxycarbonyloxyethyl ester, phthalidyl ester, (5-methyl-2-oxo-1,3-dioxolen-4-yl)methyl ester, cyclohexyloxycarbonylethyl ester or methylamide). Those compounds may be produced by a known method *per se*. The prodrug of the compound of formula (I) may be either a hydrate or a non-hydrate.

[0119] In the compound of the present invention represented by formula (I-3), preferred ring A² is any compound which is 4- to 15-membered monocyclic, bicyclic or tricyclic heterocycle which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom. More preferred is 5- to 10-membered monocyclic or bicyclic heterocycle, concretely, pyrrolidine, piperidine, morpholine, tetrahydropyridine, perhydroquinoline, perhydroisoquinoline, perhydrodiazepine, perhydroazepine, perhydroazocine, perhydroazonine, perhydroazecine, 2-azabicyclo[3.2.2]nonane, 3-azabicyclo[3.2.2]nonane, 1-azabicyclo[2.2.2]octane or 2-azabicyclo[2.2.2]octane *etc.*, and most preferred is piperidine or perhydroazepine *etc.*

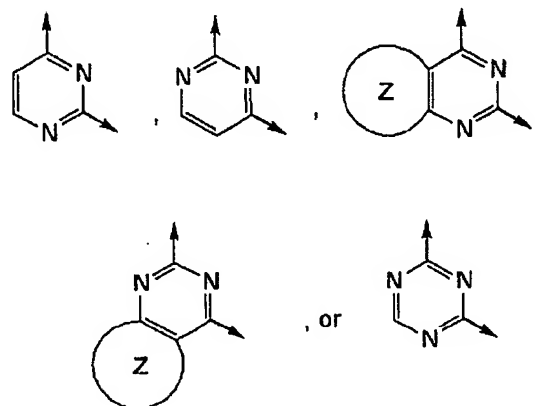
[0120] In the present invention, R^a is all preferred and more preferred is C1-4 alkyl which may be substituted with ring D, OR¹¹, OCOR¹², NR¹⁴R¹⁵, NR¹⁶COR¹², NR¹⁶CONR¹⁴R¹⁵, COOR¹³, COR¹², CONR¹⁴R¹⁵ or ring D *etc.* More preferred is C1-4 alkyl, phenyl, benzyl, acetyl, benzyloxycarbonyl, hydroxy, ethoxycarbonyl, carbamoyl, piperidinyl or cyclohexyl *etc.*

[0121] In the compound of the present invention represented by formula (I-3), preferred ring B² is any compound which is 5- to 15-membered monocyclic, bicyclic or tricyclic heterocycle which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom. More preferred is 6 membered heterocyclic ring which may be fused with ring Z and which contains 1 to 3 nitrogen atoms.

[0122] Preferred as the above-described 6 membered heterocyclic ring is pyridine, pyrazine, pyrimidine, triazine, piperidine, piperazine, tetrahydropyridine, tetrahydropyrazine, tetrahydropyrimidine, tetrahydrotriazine *etc.*

[0123] In the present invention, preferred ring Z is C5-7 monocyclic carbocycle or 5-to 7-membered monocyclic heterocycle *etc.*

[0124] In the present invention, preferred ring B² is ring B^{A1} or ring B^{A2}. Moreover,

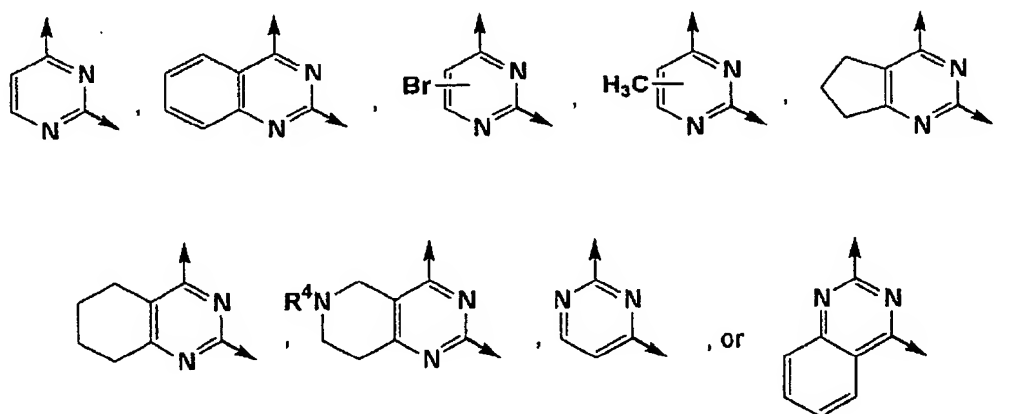


(wherein the upward arrow represents a binding position to ring A²; and the right-downward arrow represents a binding position to the nitrogen atom bound to L.) *etc.* is also preferred.

[0125] In the present invention, R^b is all preferred, and more preferred is C1-4 alkyl which may be substituted with ring D, OR¹¹, OCOR¹², NR¹⁴R¹⁵, N-R¹⁶COR¹², NR¹⁶CONR¹⁴R¹⁵, COOR¹³, COR¹², CONR¹⁴R¹⁵ or ring D *etc.* More preferred is C1-4 alkyl, phenyl, benzyl, acetyl, benzyloxycarbonyl, hydroxy, ethoxycarbonyl, carbamoyl, piperidinyl or cyclohexyl *etc.*

[0126] In the compound represented by formula (I-A) of the present invention, 4- to 15-membered monocyclic, bicyclic or tricyclic heterocycle which is saturated or has one double bond and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom is all preferred as ring A^A, and particularly preferred is 5- to 10-membered monocyclic or bicyclic heterocycle which is saturated or has one double bond and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom.

[0127] In the compound represented by formula (I-A) of the present invention, the ring described in ring B^{A1} and ring B^{A2} is all preferred as ring B^A. More preferred is



(wherein the upward arrow represents a binding position to ring A^A; and the right-downward arrow represents a binding position to the nitrogen atom bound to L.) *etc.*

[0128] In the compound represented by formula (I-B) of the present invention, 7- to 15-membered monocyclic, bicyclic or tricyclic heterocycle which is saturated or contains one double bond and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom is all preferred as ring A^B,

and particularly preferred is 7- to 10-membered monocyclic, bicyclic or tricyclic heterocycle which is saturated or contains one double bond and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom.

[0129] In the compound represented by formula (I-B) of the present invention, ring B^B is all preferred, and pyrimidine which may be fused with ring Z *etc.* is more preferred. Preferred ring Z is C5-7 monocyclic carbocycle or 5 to 7 membered monocyclic heterocycle *etc.*

[0130] In the present invention, L is all preferred. Bond, C1-6 alkylene or C3-8 carbocycle *etc.* is more preferred. Bond, C1-4 alkylene or C3-7 carbocycle *etc.* is particularly preferred.

[0131] In the present invention, both NR¹R² and ring C are preferable as Q.

[0132] In the present invention, preferable as R¹ and R² among NR¹R² represented by Q is hydrogen atom, C1-12 alkyl substituted with R¹⁰, C2-12 alkenyl, or C1-12 alkyl or C2-12 alkenyl substituted with ring D. More preferable is hydrogen atom, methyl, ethyl, propyl, isobutyl, butyl or methylthiopropyl *etc.*

[0133] In the present invention, preferable as ring C represented by Q is azetidine, pyrrolidine, morpholine, piperazine, thiomorpholine, perhydroazepine, perhydroazocine, perhydroazonine or perhydroazecine *etc.*

[0134] In the present invention, preferable as ring D is C3-10 carbocycle or 5- to 15-membered heterocycle *etc.* More preferable is benzene, benzofuran, benzothiophene, pyrazole, benzodioxole, tetrahydrobenzene, furan, thiazole, naphthalene, thiophene, cyclopropane, quinoline, pyridine or cyclohexane *etc.*

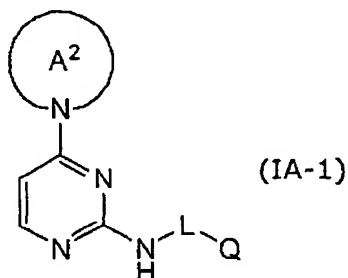
[0135] In the present invention, preferable as R³ is C1-10 alkyl, C2-10 alkenyl, C2-10 alkynyl, C1-10 alkyl substituted with R¹⁰, COOR¹², OR¹¹, NR¹⁴R¹⁵, COR¹², CONR¹⁴R¹⁵ or ring E.

[0136] In the present invention, preferable as R¹⁰ among R³ is COOR¹², OR¹¹, NR¹⁴R¹⁵, COR¹², CONR¹⁴R¹⁵ or ring E.

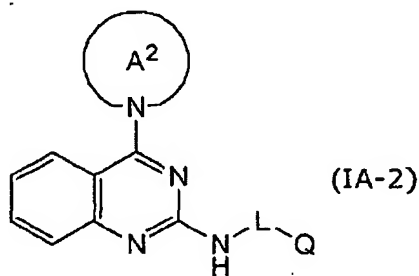
[0137] In the present invention, R⁴ is all preferable. More preferable is hydrogen atom, C1-8 alkyl, phenyl, COR⁵ or COOR⁶.

[0138] In the compound represented by formula (I), compounds represented by formulae (I-1), (I-2), (I-3), (I-A) and (I-B) *etc.* are preferable.

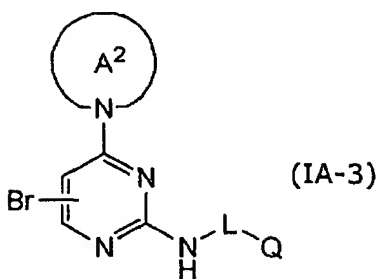
[0139] Among the compound represented by formula (I-3), preferred compounds are compounds represented by formula (IA-1)



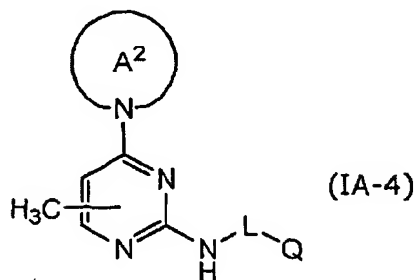
(wherein all symbols have the same meanings as described above.), compounds represented by formula (IA-2)



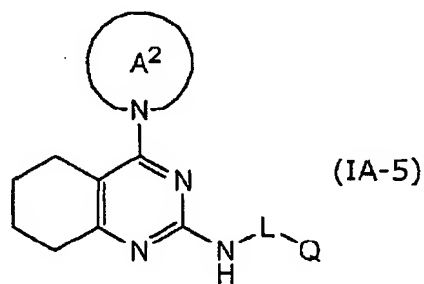
(wherein all symbols have the same meanings as described above.), compounds represented by formula (IA-3)



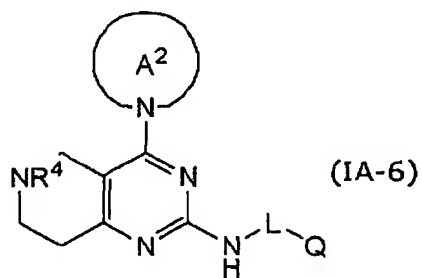
(wherein all symbols have the same meanings as described above.), compounds represented by formula (IA-4)



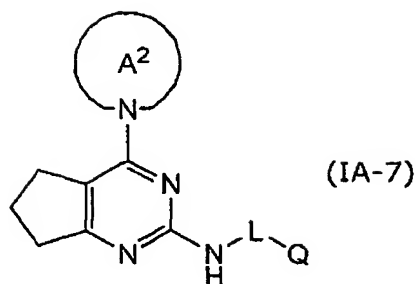
25 (wherein all symbols have the same meanings as described above.), compounds represented by formula (IA-5)



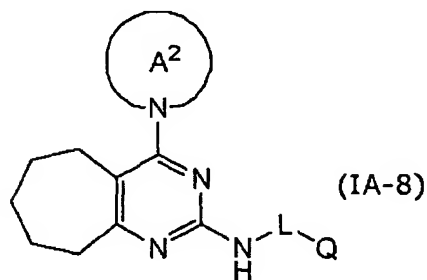
40 (wherein all symbols have the same meanings as described above.), compounds represented by formula (IA-6)



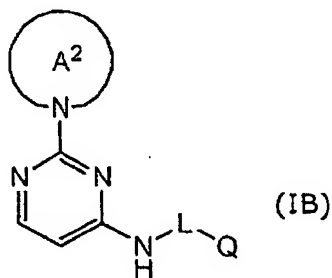
(wherein all symbols have the same meanings as described above.), compounds represented by formula (IA-7)



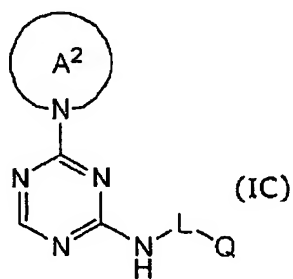
(wherein all symbols have the same meanings as described above.), compounds represented by formula (IA-8)



25 (wherein all symbols have the same meanings as described above.), compounds represented by formula (IB)



40 (wherein all symbols have the same meanings as described above.), and compounds represented by formula (IC)



(wherein all symbols have the same meanings as described above.).

[0140] Compounds represented in example and compounds represented below, salts thereof, N-oxides thereof or solvates thereof, or prodrugs thereof are included as a specific compound of the present invention.

- 55
- (1) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²,N²-dimethylethane-1,2-diamine,
 - (2) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-(2-ethylbutyl)-N²-methylethane-1,2-diamine,
 - (3) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-methyl-N²-nonylethane-1,2-diamine,

- (4) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-methyl-N²-[2-(methylsulfanyl)ethyl]ethane-1,2-diamine,
 (5) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-benzyl-N²-methylethane-1,2-diamine,
 (6) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-{4-[3-(dimethylamino)propoxy]benzyl}-N²-methylethane-1,2-diamine,
 5 (7) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-methyl-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]ethane-1,2-diamine,
 (8) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-methylethane-1,2-diamine,
 (9) 4-azepan-1-yl-N-[(1-methylpyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (10) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)pyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 10 (11) 4-azepan-1-yl-N-[(1-nonylpyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (12) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]pyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (13) 4-azepan-1-yl-N-[(1-benzylpyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (14) 4-azepan-1-yl-N-[(1-[4-[3-(dimethylamino)propoxy]benzyl]pyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 15 (15) 4-azepan-1-yl-N-[(1-[3-(3-phenyl-1H-pyrazol-4-yl)methyl]pyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (16) 4-azepan-1-yl-N-(pyrrolidin-2-ylmethyl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (17) 4-azepan-1-yl-N-[(1-methylpiperidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (18) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)piperidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 20 (19) 4-azepan-1-yl-N-[(1-nonylpiperidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (20) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]piperidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (21) 4-azepan-1-yl-N-[(1-benzylpiperidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (22) 4-azepan-1-yl-N-[(1-[4-[3-(dimethylamino)propoxy]benzyl]piperidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 25 (23) 4-azepan-1-yl-N-[(1-[3-(3-phenyl-1H-pyrazol-4-yl)methyl]piperidin-2-yl)methyl]-5,6,7,8-tetrahydroquinazolin-2-amine,
 (24) 4-azepan-1-yl-N-(piperidin-2-ylmethyl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (25) 4-azepan-1-yl-N-(1-methylpyrrolidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (26) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)pyrrolidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 30 (27) 4-azepan-1-yl-N-(1-nonylpyrrolidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (28) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]pyrrolidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (29) 4-azepan-1-yl-N-(1-benzylpyrrolidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (30) 4-azepan-1-yl-N-(1-[4-[3-(dimethylamino)propoxy]benzyl]pyrrolidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (31) 4-azepan-1-yl-N-[(1-[3-(3-phenyl-1H-pyrazol-4-yl)methyl]pyrrolidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 35 (32) 4-azepan-1-yl-N-pyrrolidin-3-yl-5,6,7,8-tetrahydroquinazolin-2-amine,
 (33) 4-azepan-1-yl-N-(1-methylpiperidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (34) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)piperidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (35) 4-azepan-1-yl-N-(1-nonylpiperidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (36) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]piperidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 40 (37) 4-azepan-1-yl-N-(1-benzylpiperidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (38) 4-azepan-1-yl-N-(1-[4-[3-(dimethylamino)propoxy]benzyl]piperidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (39) 4-azepan-1-yl-N-[(1-[3-(3-phenyl-1H-pyrazol-4-yl)methyl]piperidin-3-yl)-5,6,7,8-tetrahydroquinazolin-2-amine,
 (40) 4-azepan-1-yl-N-piperidin-3-yl-5,6,7,8-tetrahydroquinazolin-2-amine,
 (41) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-methylcyclohexane-1,2-diamine,
 45 (42) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-(2-ethylbutyl)cyclohexane-1,2-diamine,
 (43) N³-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-nonylpiperidine-2,3-diamine,
 (44) N³-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-[2-(methylsulfanyl)ethyl]piperidin-2,3-diamine,
 (45) N³-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-benzylpiperidine-2,3-diamine,
 (46) N³-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-{4-[3-(dimethylamino)propoxy]benzyl]piperidin-2,3-diamine,
 50 (47) N³-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]piperidine-2,3-diamine,
 (48) N-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)cyclohexane-1,2-diamine,
 (49) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-methylcyclopentane-1,2-diamine,
 55 (50) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-(2-ethylbutyl)cyclopentane-1,2-diamine,
 (51) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-nonylcyclopentane-1,2-diamine,
 (52) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-[2-(methylsulfanyl)ethyl]cyclopentane-1,2-diamine,
 (53) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-benzylcyclopentane-1,2-diamine,

- (54) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-{4-[3-(dimethylamino)propoxy]benzyl}cyclopentane-1,2-diamine,
- (55) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]cyclopentane-1,2-diamine,
- 5 (56) N-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)cyclopentane-1,2-diamine,
- (57) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²,N²-dimethylethane-1,2-diamine,
- (58) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-(2-ethylbutyl)-N²-methylethane-1,2-diamine,
- (59) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-methyl-N²-nonylethane-1,2-diamine,
- 10 (60) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-methyl-N²-[2-(methylsulfanyl)ethyl]ethane-1,2-diamine,
- (61) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-benzyl-N²-methylethane-1,2-diamine,
- (62) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-{4-[3-(dimethylamino)propoxy]benzyl}-N²-methylethane-1,2-diamine,
- 15 (63) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-methyl-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]ethane-1,2-diamine,
- (64) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-methylethane-1,2-diamine,
- (65) 4-azepan-1-yl-N-[(1-methylpyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (66) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)pyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- 20 (67) 4-azepan-1-yl-N-[(1-nonylpyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (68) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]pyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (69) 4-azepan-1-yl-N-[(1-benzylpyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (70) 4-azepan-1-yl-N-[(1-[4-[3-(dimethylamino)propoxy]benzyl]pyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- 25 (71) 4-azepan-1-yl-N-[(1-[3-(3-phenyl-1H-pyrazol-4-yl)methyl]pyrrolidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (72) 4-azepan-1-yl-N-(pyrrolidin-2-ylmethyl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (73) 4-azepan-1-yl-N-[(1-methylpiperidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- 30 (74) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)piperidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (75) 4-azepan-1-yl-N-[(1-nonylpiperidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (76) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]piperidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (77) 4-azepan-1-yl-N-[(1-benzylpiperidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- 35 (78) 4-azepan-1-yl-N-[(1-[4-[3-(dimethylamino)propoxy]benzyl]piperidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (79) 4-azepan-1-yl-N-[(1-[3-(3-phenyl-1H-pyrazol-4-yl)methyl]piperidin-2-yl)methyl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (80) 4-azepan-1-yl-N-(piperidin-2-ylmethyl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- 40 (81) 4-azepan-1-yl-N-(1-methylpyrrolidin-3-yl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (82) 4-azepan-1-yl-N-[1-(2-ethylbutyl)pyrrolidin-3-yl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (83) 4-azepan-1-yl-N-(1-nonylpyrrolidin-3-yl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (84) 4-azepan-1-yl-N-[1-[2-(methylsulfanyl)ethyl]pyrrolidin-3-yl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (85) 4-azepan-1-yl-N-(1-benzylpyrrolidin-3-yl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- 45 (86) 4-azepan-1-yl-N-(1-[4-[3-(dimethylamino)propoxy]benzyl]pyrrolidin-3-yl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (87) 4-azepan-1-yl-N-[1-[3-(3-phenyl-1H-pyrazol-4-yl)methyl]pyrrolidin-3-yl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (88) 4-azepan-1-yl-N-pyrrolidin-3-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- 50 (89) 4-azepan-1-yl-N-(1-methylpiperidin-3-yl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (90) 4-azepan-1-yl-N-[1-(2-ethylbutyl)piperidin-3-yl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (91) 4-azepan-1-yl-N-(1-nonylpiperidin-3-yl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (92) 4-azepan-1-yl-N-[1-[2-(methylsulfanyl)ethyl]piperidin-3-yl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (93) 4-azepan-1-yl-N-(1-benzylpiperidin-3-yl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- 55 (94) 4-azepan-1-yl-N-(1-[4-[3-(dimethylamino)propoxy]benzyl]piperidin-3-yl)-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
- (95) 4-azepan-1-yl-N-[1-[3-(3-phenyl-1H-pyrazol-4-yl)methyl]piperidin-3-yl]-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,

- (96) 4-azepan-1-yl-N-piperidin-3-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-amine,
 (97) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-methylcyclohexane-1,2-diamine,
 (98) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-(2-ethylbutyl)cyclohexane-1,2-diamine,
 (99) N³-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-nonylpiperidine-2,3-diamine,
 5 (100) N³-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-[2-(methylsulfanyl)ethyl]piperidine-2,3-diamine,
 (101) N³-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-benzylpiperidine-2,3-diamine,
 (102) N³-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-[4-[3-(dimethylamino)propoxy]benzyl]piperidine-2,3-diamine,
 10 (103) N³-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]piperidine-2,3-diamine,
 (104) N-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)cyclohexane-1,2-diamine,
 (105) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-methylcyclopentane-1,2-diamine,
 (106) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-(2-ethylbutyl)cyclopentane-1,2-diamine,
 15 (107) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-nonylcyclopentane-1,2-diamine,
 (108) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-[2-(methylsulfanyl)ethyl]cyclopentane-1,2-diamine,
 (109) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-benzylcyclopentane-1,2-diamine,
 (110) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-[4-[3-(dimethylamino)propoxy]benzyl]cyclopentane-1,2-diamine,
 20 (111) N¹-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]cyclopentane-1,2-diamine,
 (112) N-(4-azepan-1-yl-5,6,7,8-tetrahydropyrido[4,3-d]pyrimidin-2-yl)cyclopentane-1,2-diamine,
 (113) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²,N²-dimethylethane-1,2-diamine,
 25 (114) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-(2-ethylbutyl)-N²-methylethane-1,2-diamine,
 (115) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-methyl-N²-nonylethane-1,2-diamine,
 (116) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-methyl-N²-[2-(methylsulfanyl)ethyl]ethane-1,2-diamine,
 (117) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-benzyl-N²-methylethane-1,2-diamine,
 30 (118) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-[4-[3-(dimethylamino)propoxy]benzyl]-N²-methylethane-1,2-diamine,
 (119) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-methyl-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]ethane-1,2-diamine,
 (120) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-methylethane-1,2-diamine,
 35 (121) 4-azepan-1-yl-N-[(1-methylpyrrolidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (122) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)pyrrolidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (123) 4-azepan-1-yl-N-[(1-nonylpyrrolidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (124) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]pyrrolidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 40 (125) 4-azepan-1-yl-N-[(1-benzylpyrrolidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (126) 4-azepan-1-yl-N-[(1-[4-[3-(dimethylamino)propoxy]benzyl]pyrrolidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (127) 4-azepan-1-yl-N-[(1-[3-phenyl-1H-pyrazol-4-yl)methyl]pyrrolidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 45 (128) 4-azepan-1-yl-N-(pyrrolidin-2-ylmethyl)-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (129) 4-azepan-1-yl-N-[(1-methylpiperidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (130) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)piperidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (131) 4-azepan-1-yl-N-[(1-nonylpiperidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 50 (132) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]piperidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (133) 4-azepan-1-yl-N-[(1-benzylpiperidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (134) 4-azepan-1-yl-N-[(1-[4-[3-(dimethylamino)propoxy]benzyl]piperidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (135) 4-azepan-1-yl-N-[(1-[3-phenyl-1H-pyrazol-4-yl)methyl]piperidin-2-yl)methyl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 55 (136) 4-azepan-1-yl-N-(piperidin-2-ylmethyl)-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (137) 4-azepan-1-yl-N-(1-methylpyrrolidin-3-yl)-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (138) 4-azepan-1-yl-N-[1-(2-ethylbutyl)pyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,

- (139) 4-azepan-1-yl-N-(1-nonylpyrrolidin-3-yl)-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (140) 4-azepan-1-yl-N-{1-[2-(methylsulfanyl)ethyl]pyrrolidin-3-yl}-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (141) 4-azepan-1-yl-N-(1-benzylpyrrolidin-3-yl)-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (142) 4-azepan-1-yl-N-(1-{4-[3-(dimethylamino)propoxy]benzyl}pyrrolidin-3-yl)-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (143) 4-azepan-1-yl-N-{1-[(3-phenyl-1H-pyrazol-4-yl)methyl]pyrrolidin-3-yl}-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (144) 4-azepan-1-yl-N-pyrrolidin-3-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (145) 4-azepan-1-yl-N-(1-methylpiperidin-3-yl)-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (146) 4-azepan-1-yl-N-{1-(2-ethylbutyl)piperidin-3-yl}-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (147) 4-azepan-1-yl-N-(1-nonylpiperidin-3-yl)-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (148) 4-azepan-1-yl-N-{1-[2-(methylsulfanyl)ethyl]piperidin-3-yl}-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (149) 4-azepan-1-yl-N-(1-benzylpiperidin-3-yl)-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (150) 4-azepan-1-yl-N-{1-[4-[3-(dimethylamino)propoxy]benzyl]piperidin-3-yl}-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (151) 4-azepan-1-yl-N-{1-[(3-phenyl-1H-pyrazol-4-yl)methyl]piperidin-3-yl}-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (152) 4-azepan-1-yl-N-piperidin-3-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine,
 (153) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-methylcyclohexane-1,2-diamine,
 (154) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-(2-ethylbutyl)cyclohexane-1,2-diamine,
 (155) N³-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-nonylpiperidine-2,3-diamine,
 (156) N³-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-[2-(methylsulfanyl)ethyl]piperidine-2,3-diamine,
 (157) N³-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-benzylpiperidine-2,3-diamine,
 (158) N³-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-{4-[3-(dimethylamino)propoxy]benzyl}piperidine-2,3-diamine,
 (159) N³-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]piperidine-2,3-diamine,
 (160) N-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)cyclohexane-1,2-diamine,
 (161) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-methylcyclopentane-1,2-diamine,
 (162) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-(2-ethylbutyl)cyclopentane-1,2-diamine,
 (163) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-nonylcyclopentane-1,2-diamine,
 (164) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-[2-(methylsulfanyl)ethyl]cyclopentane-1,2-diamine,
 (165) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-benzylcyclopentane-1,2-diamine,
 (166) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-{4-[3-(dimethylamino)propoxy]benzyl}cyclopentane-1,2-diamine,
 (167) N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]cyclopentane-1,2-diamine,
 (168) N-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)cyclopentane-1,2-diamine,
 (169) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²,N²-dimethylethane-1,2-diamine,
 (170) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-(2-ethylbutyl)-N²-methylethane-1,2-diamine,
 (171) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-methyl-N²-nonylethane-1,2-diamine,
 (172) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-methyl-N²-[2-(methylsulfanyl)ethyl]ethane-1,2-diamine,
 (173) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-benzyl-N²-methylethane-1,2-diamine,
 (174) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-{4-[3-(dimethylamino)propoxy]benzyl}-N²-methylethane-1,2-diamine,
 (175) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-methyl-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]ethane-1,2-diamine,
 (176) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-methylethane-1,2-diamine,
 (177) 4-azepan-1-yl-N-[(1-methylpyrrolidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (178) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)pyrrolidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (179) 4-azepan-1-yl-N-[(1-nonylpyrrolidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (180) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]pyrrolidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,

- (181) 4-azepan-1-yl-N-[(1-benzylpyrrolidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (182) 4-azepan-1-yl-N-[(1-{4-[3-(dimethylamino)propoxy]benzyl}pyrrolidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (183) 4-azepan-1-yl-N-[(1-{(3-phenyl-1H-pyrazol-4-yl)methyl}pyrrolidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (184) 4-azepan-1-yl-N-(pyrrolidin-2-ylmethyl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (185) 4-azepan-1-yl-N-[(1-methylpiperidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (186) 4-azepan-1-yl-N-[(1-(2-ethylbutyl)piperidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (187) 4-azepan-1-yl-N-[(1-nonylpiperidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (188) 4-azepan-1-yl-N-[(1-[2-(methylsulfanyl)ethyl]piperidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (189) 4-azepan-1-yl-N-[(1-benzylpiperidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (190) 4-azepan-1-yl-N-[(1-{4-[3-(dimethylamino)propoxy]benzyl}piperidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (191) 4-azepan-1-yl-N-[(1-{(3-phenyl-1H-pyrazol-4-yl)methyl}piperidin-2-yl)methyl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (192) 4-azepan-1-yl-N-(piperidin-2-ylmethyl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (193) 4-azepan-1-yl-N-(1-methylpyrrolidin-3-yl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (194) 4-azepan-1-yl-N-[1-(2-ethylbutyl)pyrrolidin-3-yl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (195) 4-azepan-1-yl-N-(1-nonylpyrrolidin-3-yl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (196) 4-azepan-1-yl-N-[1-[2-(methylsulfanyl)ethyl]pyrrolidin-3-yl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (197) 4-azepan-1-yl-N-(1-benzylpyrrolidin-3-yl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (198) 4-azepan-1-yl-N-[(1-{4-[3-(dimethylamino)propoxy]benzyl}pyrrolidin-3-yl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (199) 4-azepan-1-yl-N-[1-{(3-phenyl-1H-pyrazol-4-yl)methyl}pyrrolidin-3-yl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (200) 4-azepan-1-yl-N-pyrrolidin-3-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (201) 4-azepan-1-yl-N-(1-methylpiperidin-3-yl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (202) 4-azepan-1-yl-N-[1-(2-ethylbutyl)piperidin-3-yl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (203) 4-azepan-1-yl-N-(1-nonylpiperidin-3-yl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (204) 4-azepan-1-yl-N-[1-[2-(methylsulfanyl)ethyl]piperidin-3-yl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (205) 4-azepan-1-yl-N-(1-benzylpiperidin-3-yl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (206) 4-azepan-1-yl-N-(1-{4-[3-(dimethylamino)propoxy]benzyl}piperidin-3-yl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (207) 4-azepan-1-yl-N-[1-{(3-phenyl-1H-pyrazol-4-yl)methyl}piperidin-3-yl]-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (208) 4-azepan-1-yl-N-piperidin-3-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-amine,
 (209) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-methylcyclohexane-1,2-diamine,
 (210) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-(2-ethylbutyl)cyclohexane-1,2-diamine,
 (211) N³-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-nonylpiperidine-2,3-diamine,
 (212) N³-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-[2-(methylsulfanyl)ethyl]piperidine-2,3-diamine,
 (213) N³-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-benzylpiperidine-2,3-diamine,
 (214) N³-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-[4-[3-(dimethylamino)propoxy]benzyl]piperidine-2,3-diamine,
 (215) N³-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]piperidine-2,3-diamine,
 (216) N-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)cyclohexane-1,2-diamine,
 (217) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-methyleyclopentane-1,2-diamine,
 (218) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-(2-ethylbutyl)cyclopentane-1,2-diamine,
 (219) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-nonylcyclopentane-1,2-diamine,
 (220) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-[2-(methylsulfanyl)ethyl]cyclopentane-1,2-diamine,
 (221) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-benzylcyclopentane-1,2-diamine,

- (222) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-{4-[3-(dimethylamino)propoxy]benzyl}cyclopentane-1,2-diamine,
 (223) N¹-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)-N²-[(3-phenyl-1H-pyrazol-4-yl)methyl]cyclopentane-1,2-diamine, and
 (224) N-(4-azepan-1-yl-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)cyclopentane-1,2-diamine.

[0141] Among the compounds represented by formula (I), more preferable are below-described compounds, salts thereof, N-oxides thereof or solvates thereof, or prodrugs thereof.

- (1) N-(4-azepan-1-ylpyrimidin-2-yl)ethane-1,2-diamine,
 (2) N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²,N²-dimethylethane-1,2-diamine,
 (3) 4-azepan-1-yl-N-[(3S)-1-cyclohexylpyrrolidin-3-yl]pyrimidin-2-amine,
 (4) 4-azepan-1-yl-N-[(3S)-1-benzylpyrrolidin-3-yl]pyrimidin-2-amine,
 (5) 4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)piperidin-3-yl]pyrimidin-2-amine,
 (6) 4-azepan-1-yl-N-[(3S)-1-cyclohexylpiperidin-3-yl]pyrimidin-2-amine,
 (7) 4-azepan-1-yl-N-[(3S)-1-tetrahydro-2H-pyran-4-ylpiperidin-3-yl]pyrimidin-2-amine,
 (8) 4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanol and
 (9) (3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclohexylcarbonyl)-1,4'-bipiperidin-3-amine.

[0142] Moreover besides the above-described compounds, below-described compounds, salts thereof, N-oxides thereof or solvates thereof, or prodrugs thereof are included as compounds represented by formula (II).

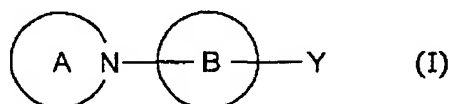
- (1) 5-[(3-azetidin-1-ylphenyl)amino]-1-(2-hydroxycyclohexyl)piperidin-3-ol,
 (2) 1-(3-hydroxycyclohexyl)-5-[(6-pyrrolidin-1-ylpyrazin-2-yl)amino]piperidin-3-carboxylic acid,
 (3) 1-butyl-5-[(6-piperidin-1-ylpyridin-2-yl)amino]piperidin-2-carboxylic acid,
 (4) 3-[[5-(3-hydroxyazepan-1-yl)-1-methyl-1H-pyrrol-2-yl]amino]-1-[4-(hydroxymethyl)cyclohexyl]piperidin-2-carboxylic acid,
 (5) 1-[2-[(4-hydroxy-1'-[(2-hydroxycyclohexyl)carbonyl]-1,4'-bipiperidin-3-yl)amino]-6-oxo-1,6-dihydropyrimidin-4-yl]proline,
 (6) 3-[[1-(3-aminopyrrolidin-1-yl)-2-methyl-6-oxo-1,6-dihydropyrimidin-5-yl]amino]-1'-[(3-hydroxycyclohexyl)carbonyl]-1,3'-bipiperidin-4-carboxylic acid,
 (7) 2-(3-[[4-(3-[(methylamino)carbonyl]piperidin-1-yl)-1,3,5-triazin-2-yl]amino]methyl)piperidin-1-yl)cyclohexanecarboxylic acid,
 (8) N-(1-[5-(2-[1-(3-(hydroxymethyl)cyclohexyl]piperidin-3-yl)ethyl)amino]pyridazin-3-yl)piperidin-4-yl)acetamide,
 (9) 3-(3-hydroxy-5-[[5-(3-[(methylsulfonyl)amino]azetidin-1-yl)pyridazin-3-yl]amino]methyl)piperidin-1-yl)cyclohexanecarboxylic acid,
 (10) 1-(2-aminocyclohexyl)-5-[[6-(2-(hydroxymethyl)pyrrolidin-1-yl)pyrimidin-4-yl]amino]methylpiperidin-3-carboxylic acid,
 (11) 2-amino-N-(3-[3-(4-pyridin-2-ylquinolin-2-yl)amino]pyrrolidin-1-yl)cyclohexyl)cyclohexanecarboxamide,
 (12) 1-phenyl-N-[(1-pyridin-3-ylisoquinolin-3-yl)methyl]piperidin-3-amine,
 (13) [4-(7-[[6-(4-hydroxyphenyl)pyridin-3-yl]amino]-1H-indol-2-yl)piperidin-1-yl]acetic acid,
 (14) 2-(3-[4-[[2-(4-(cyclohexylsulfonyl)-3-methoxyphenyl]pyridin-4-yl)methyl]amino]-1H-indol-3-yl)piperidin-1-yl)-N-methylacetamide,
 (15) {5-[4-[[2-(1-methylpiperidin-2-yl)-1,3-benzoxazol-4-yl]amino]-3,4-dihydroisoquinolin-2(1H)-yl]thien-2-yl}(phenyl)methanone,
 (16) (6-[[1-[[7-(1-adamantylamino)-1-benzothien-2-yl]amino]methyl]cyclohexyl]amino)pyridin-3-yl)(thien-2-yl)methanone,
 (17) 4-[3-[[6-[[1-(hydroxycyclohexyl)methyl]-6-azaspiro[4.5]dec-8-yl]amino]-1-benzothien-4-yl]-N-methylpiperazine-1-carboxamide,
 (18) 2-[2-[[5-[4-(methylsulfonyl)piperazin-1-yl]pyrimidin-2-yl]amino]methyl]pyrrolidin-1-yl)-6-phenylnicotinic acid,
 (19) N-(1-[4-methoxy-4-(1,3-thiazol-2-yl)cyclohexyl](methyl)amino)methylcyclopropyl)-4-(5,6,7,8-tetrahydroquinolin-2-yl)-1H-imidazol-2-amine,
 (20) 5-(1-methyl-1,2,3,4-tetrahydroquinolin-8-yl)-N-([5-[1-(3,4,5,6-tetrahydropyridin-2-yl)piperidin-4-yl]pyridin-3-yl)methyl]pyrazin-2-amine,
 (21) 1-[3-(4-[[4-(3,4-dihydroquinolin-1(2H)-yl)-5-fluoropyrimidin-2-yl]amino]piperidin-1-yl)phenyl]-2,2-dimethylpropan-1-one,
 (22) 1-(cyclohexylmethyl)-4-[[methyl(3-[[4-(3,4,5,6-tetrahydropyridin-2-ylamino)phenyl]amino)propyl]amino]methyl]cyclohexanol,

- (23) 4-(4-([4-(4,5,6,7-tetrahydro-1H-1,3-diazepin-2-yl)pyrimidin-2-yl]amino)azepan-1-yl)cyclohexylmethylcarbamate,
 (24) 4-(3-([4-(1-cyanocyclobutyl)pyrimidin-2-yl]amino)azetidin-1-yl)-2-(cyclopentyloxy)benzamide,
 (25) 1-([4-(4-([4-(1-hydroxycyclopentyl)pyrimidin-2-yl]amino)methyl)piperidin-1-yl]tetrahydro-2H-pyran-4-yl)acetyl)piperidin-4-ol,
 (26) 1-(2-([2-(2-tetrahydro-2H-pyran-4-yl)pyridin-4-yl]-2-azabicyclo[2.2.2]oct-4-yl]amino)pyrimidin-4-yl)cycloheptanol,
 (27) 3-([4-(3-([6-(benzyl(ethyl)amino)pyridazin-3-yl]amino)-8-azabicyclo[3.2.1]oct-8-yl]-4-methylpiperidin-1-yl)carbonyl)phenol,
 (28) N-([4-(3-([4-(azepan-1-yl-5-phenyl-1,3-thiazol-2-yl)amino)ethyl](methyl)amino)-1-hydroxycyclohexyl)methyl)morpholine-4-carboxamide,
 (29) 2-azepan-1-yl-5-([1'-(pyridin-3-ylmethyl)-1,3'-bipiperidin-4-yl] amino)thiophene-3,4-dicarbonitrile,
 (30) 4-(3-([2-(pyrrolidin-1-yl)phenyl]amino)pyrrolidin-1-yl)methyl)cyclohexanol,
 (31) methyl 4-(3-([6-(3-azabicyclo[3.1.1]hept-3-yl)pyrimidin-4-yl]amino)piperidin-1-yl)butanoate,
 (32) [2-([3-([4-(azocan-1-yl)pyrimidin-2-yl]amino)azetidin-1-yl]methyl)phenyl](1-methylpiperidin-4-yl)methanone,
 (33) N-(6-azonan-1-ylpyrimidin-4-yl)-1-[4-(tetrahydro-2H-pyran-4-yloxy)phenyl]azepan-3-amine,
 (34) 2-[3-([4-(azepan-1-yl)quinazolin-2-yl]amino)pyrrolidin-1-yl]-1,3-thiazol-4-carboxamide,
 (35) N¹-(4-azepan-1-ylthieno[3,2-d]pyrimidin-3-yl)-N⁴-cyclohexyl-N⁴-methylbutane-1,4-diamine,
 (36) 4-azepan-1-yl-N-(1-cyclopropylpiperidin-3-yl)-1,3-benzothiazol-2-amine,
 (37) N-[1-(1-naphthylmethyl)azetidin-3-yl]-4-piperidin-1-yl-5,7-dihydrofuro[3,4-d]pyrimidin-2-amine,
 (38) 6-azepan-1-yl-N-[1-(4-phenoxyphenyl)piperidin-4-yl]-9H-purin-2-amine,
 (39) 4-azepan-1-yl-N-[1-(2-cyclopentylethyl)azepan-4-yl]-1-methyl-1H-pyrazolo[3,4-d]pyrimidin-6-amine and
 (40) N-[4-([3-([5-azepan-1-ylpyrazin-2-yl]amino)piperidin-1-yl]methyl)phenyl]acetamide.

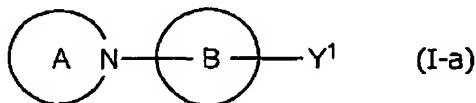
Processes for the preparation of the compound of the present invention:

[0143] The compound of the present invention can be prepared by a method, such as a method described below, a method according to that, or a method described in Examples. In each method described below, a starting material can be used as a salt thereof. An example of the salt includes a salt of compound of formula (I) described above.

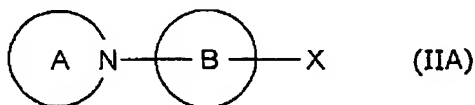
[1] Among a compound represented by formula (I)



(wherein all symbols have the same meanings as described above.), a compound in which Y is an amino group which may be protected, a hydroxyl group which may be protected or a mercapto group which may be protected, i.e., a compound represented by formula (I-a)



(wherein Y¹ is an amino group which may be protected, a hydroxyl group which may be protected or a mercapto group which may be protected and other symbols have the same meanings as described above.) can be prepared by reacting a compound represented formula (IIA)



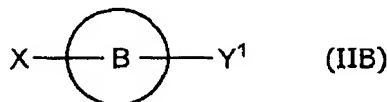
(wherein X is a leaving group such as halogen atom, methanesulfonyloxy (OMs), p-toluenesulfonyloxy (OTs),

EP 1 571 146 A1

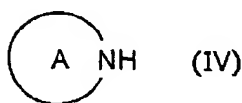
trifluoromethanesulfonyloxy (OTf), alkylthio, alkylsulfinyl, alkylsulfonyl or hydroxysulfonyl, and other symbols have the same meanings as described above.) with a compound represented formula (III)



(wherein all symbols have the same meanings as described above.), or reacting a compound represented by formula (IIB)



(wherein all symbols have the same meanings as described above.) with a compound represented by formula (IV)



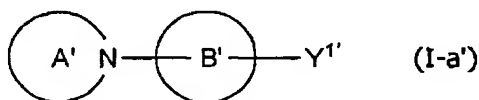
(wherein all symbols have the same meanings as described above.).

The reaction of a compound represented by formula (IIA) and a compound represented by formula (III) and the reaction of a compound represented by formula (IIB) and a compound represented by formula (IV) are known and the reactions can be carried out by below described (A) or (B).

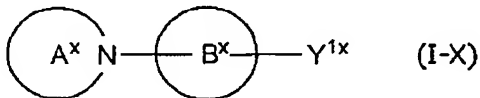
(A) It may be carried out in an organic solvent (e.g. N,N-dimethylformamide, N,N-dimethylacetamide, dimethylsulfoxide, alcohol solvent (methanol, ethanol, benzylalcohol *etc.*)) or without a solvent at -78 to 200°C.

(B) It may be carried out in an organic solvent (e.g. toluene, benzene) in the presence of a metallic salt (e.g. palladium acetate) and a ligand (e.g. tri(t-butyl)phosphine, dicyclohexyl(2-biphenyl)phosphine, 2,2-bis(diphenylphosphino)-1,1'-binaphthyl (BINAP)) by addition of a base (potassium phosphate, potassium carbonate, sodium t-butoxide, sodium hydride, sodium amyl oxide *etc.*) at -78 to 200°C.

[2] Among a compound represented by formula (I-a), a compound having at least one primary or secondary amino group in ring A, ring B, Y¹ or substituents thereof, i.e., a compound represented by formula (I-a')



(wherein ring A', ring B' and Y^{1'} have the same meanings as ring A, ring B and Y¹, respectively, with the proviso that any of those or substituents thereof has at least one primary or secondary amino group.) can be prepared by a deprotection of a compound having at least one primary or secondary amino group which is protected in ring A, ring B, Y¹ or substituents thereof among a compound represented by formula (I-a), i.e., a compound represented by formula (I-X)



(wherein ring A^X, ring B^X and Y^{1X} have the same meanings as ring A, ring B and Y¹, respectively, with the proviso that any of those or substituents thereof has at least one primary or secondary amino group which is protected by protecting groups.) protected by protecting groups.

[0144] The protective group of amino includes such as benzyloxycarbonyl, tert-butoxycarbonyl, allyloxycarbonyl (Alloc), 1-methyl-1-(4-biphenyl)ethoxycarbonyl (Bpoc), trifluoroacetyl, 9-fluorenylmethoxycarbonyl, benzyl (Bn), p-methoxybenzyl, benzyloxymethyl (BOM) and 2-(trimethylsilyl)ethoxymethyl (SEM) and the like.

[0145] With regard to the protective group for amino, there is no particular limitation to the above ones so far as it is a group which is able to be easily and selectively detached. For example, a deprotection reaction may be carried out by a method mentioned in "T. W. Greene, *Protective Groups in Organic Synthesis*, John Wiley & Sons Inc, 1999".

[0146] Deprotection reaction of a protective group for amino is known and its examples are as follows.

- (1) a hydrolyzing reaction with an alkali;
- (2) a deprotection reaction under an acidic condition;
- (3) a deprotection reaction by hydrogenolysis; and
- (4) a deprotection reaction using metal complex.

[0147] Those methods will be specifically illustrated as follows.

(1) A deprotection reaction using an alkali is carried out, for example, at the temperature of 0 to 40°C using a hydroxide of alkaline metal (such as sodium hydroxide, potassium hydroxide and lithium hydroxide), a hydroxide of alkaline earth metal (such as barium hydroxide and calcium hydroxide), a carbonate (such as sodium carbonate and potassium carbonate), an aqueous solution thereof or a mixture thereof in an organic solvent (such as methanol, tetrahydrofuran and 1,4-dioxane *etc.* alone, or a mixed solvent containing two or more solvents thereof at an optional ratio).

(2) A deprotection reaction under an acidic condition (e.g. a deprotection of t-butoxycarbonyl or trityl *etc.*) is carried out, for example, at the temperature of 0 to 100°C in an organic acid (e.g. acetic acid, trifluoroacetic acid, methanesulfonic acid), an inorganic acid (e.g. hydrochloric acid and sulfuric acid) or a mixture thereof (such as hydrogen bromide/acetic acid) in water or an organic solvent (such as dichloromethane, chloroform, 1,4-dioxane, ethyl acetate and anisole *etc.*).

(3) A deprotection reaction by hydrogenolysis is carried out, for example, at the temperature of 0 to 200°C in a hydrogen atmosphere of ordinary pressure or high pressure or in the presence of ammonium formate in the presence of a catalyst (such as palladium-carbon, palladium black, palladium hydroxide, platinum oxide and Raney nickel) in a solvent [such as an ether type (such as tetrahydrofuran, 1,4-dioxane, dimethoxyethane and diethyl ether), an alcohol type (such as methanol and ethanol), a benzene type (such as benzene and toluene), a ketone type (such as acetone and methyl ethyl ketone), a nitrile type (such as acetonitrile), an amide type (such as N,N-dimethylformamide), water, ethyl acetate, acetic acid or a mixed solvent comprising two or more thereof].

(4) A deprotection reaction using a metal complex (e.g. a deprotection of allyloxycarbonyl *etc.*) is carried out, for example, at the temperature of 0 to 40°C using a metal complex [such as tetrakis(triphenylphosphine) palladium (0), bis(triphenylphosphine) palladium (II) dichloride, palladium (II) acetate and tris(triphenylphosphine) rhodium (I) chloride] in the presence or absence of a phosphine agent (such as triphenyl phosphine) in the presence of a trap reagent (such as tributyltin hydride, triethylsilane, dimedone, morpholine, diethylamine and pyrrolidine), an organic acid (such as acetic acid, formic acid and 2-ethylhexanoic acid) and/or an organic acid salt (such as sodium 2-ethylhexanoate and potassium 2-ethylhexanoate) in an organic solvent (such as dichloromethane, N,N-dimethylformamide, tetrahydrofuran, ethyl acetate, acetonitrile, dioxane and ethanol), water or a mixed solvent thereof.

[0148] Besides the above-mentioned method, for example, a deprotection reaction may be carried out by a method mentioned in "T. W. Greene, *Protective Groups in Organic Synthesis*, John Wiley & Sons Inc, 1999".

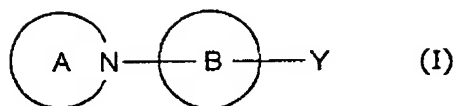
[0149] As persons skilled in the art can easily understand that the aimed compound of the present invention is able to be easily produced by using appropriate ones among those deprotection reactions.

[0150] The reaction can be followed by conversion to a desired non-toxic salt thereof by a known method, if necessary.

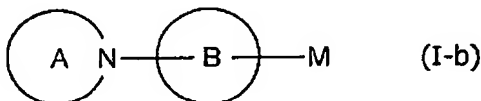
[3] A compound represented by formula (I-a) can be prepared by a reductive amination of a compound represented by formula (I-a') which prepared by the deprotection reaction of protecting groups of amino and corresponding aldehyde or ketone.

The reductive amination is conventionally known and carried out, for example, by reaction at a temperature of from 0 to 100°C in an inert organic solvent (dichloroethane, dichloromethane, N,N-dimethylformamide, *etc.* alone, or a mixed solvent containing two or more solvents thereof at an optional ratio) using a reducing agent (sodium triacetoxyborohydride, sodium cyano-borohydride, tetrabutylammonium borohydride, *etc.*), in the presence or absence of an organic acid (acetic acid, *etc.*) or in the presence or absence of a organic base (triethylamine, sodium hydrogencarbonate, *etc.*).

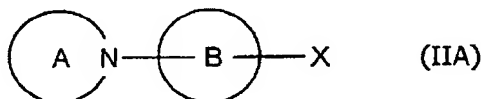
Among a compound represented by formula (I)



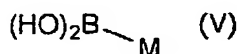
(wherein all symbols have the same meanings as described above.), a compound in which Y is hydrocarbon optionally having substituents or heterocyclic ring optionally having substituents, i.e., a compound represented by formula (I-b)



(wherein M is hydrocarbon optionally having substituents or heterocyclic ring optionally having substituents and other symbols have the same meaning as described above.) can be prepared by reacting a compound represented by formula (IIA)



(wherein all symbols have the same meanings as described above.) with a compound represented by formula (V)



(wherein all symbols have the same meanings as described above.). The reaction is known. For example, it may be carried out in organic solvent (e.g. benzene, toluene, N,N-dimethylformamide, 1,4-dioxane, tetrahydrofuran, methanol, acetonitrile, dimethoxyethane, acetone) in presence of a base (sodium ethylate, sodium hydroxide, potassium hydroxide, triethylamine, sodium carbonate, sodium bicarbonate, potassium carbonate, cesium carbonate, thallium carbonate, tripotassium phosphate, cesium fluoride, barium hydroxide, tetrabutylammonium fluoride *etc.*) or an aqueous solution thereof, or a mixture thereof, and catalyst (e.g. tetrakis(triphenylphosphine) palladium ($\text{Pd}(\text{PPh}_3)_4$), dichlorobis(triphenylphosphine) palladium ($\text{PdCl}_2(\text{PPh}_3)_2$), palladium acetate ($\text{Pd}(\text{OAc})_2$), palladium black, 1,1'-bis(diphenylphosphino)ferrocene dichloropalladium ($\text{PdCl}_2(\text{dppf})_2$), dichlorodiallyl palladium ($\text{PdCl}_2(\text{allyl})_2$), iodephenylbis(triphenylphosphine)palladium ($\text{PhPdI}(\text{PPh}_3)_2$)) at room temperature to 120°C.

[5] As apparent for those skilled in the art, when a compound represented by formula (I-a) or a compound represented by formula (I-b) has hydroxy, carboxy, amino or mercapto which is not protected, those can be prepared by the reaction described from [1] to [4] and then by a deprotection of protective groups of hydroxy, carboxy, amino or mercapto.

[0151] The protective groups of amino are above-described.

[0152] The protective group of hydroxy includes, for example, methyl, trityl, methoxymethyl (MOM), 1-ethoxyethyl (EE), methoxyethoxymethyl (MEM), 2-tetrahydropyranyl (THP), trimethylsilyl (TMS), triethylsilyl (TES), t-butyldimethylsilyl (TBDMS), t-butyldiphenylsilyl (TBDPS), acetyl (Ac), pivaloyl, benzoyl, benzyl (Bn), p-methoxybenzyl, allyloxy-carbonyl (Alloc), and 2,2,2-trichloroethoxycarbonyl (Troc) *etc.*

[0153] The protective group of mercapto includes, for example, benzyl, methoxybenzyl, methoxymethyl (MOM), 2-tetrahydropyranyl (THP), diphenylmethyl and acetyl (Ac) *etc.*

[0154] The carboxyl-protective group includes, for example, methyl, ethyl, t-butyl, allyl, phenacyl and benzyl *etc.*

[0155] With regard to the protective group for carboxyl, hydroxyl, amino and mercapto, there is no particular limitation to the above ones so far as it is a group which is able to be easily and selectively detached. For example, a deprotection reaction may be carried out by a method mentioned in "T. W. Greene, *Protective Groups in Organic Synthesis*, John Wiley & Sons Inc, 1999".

[0156] Deprotection reaction of a protective group for carboxyl, hydroxyl, amino or mercapto is known and its examples are as follows.

- (1) a hydrolyzing reaction with an alkali;
- (2) a deprotection reaction under an acidic condition;
- (3) a deprotection reaction by hydrogenolysis;
- (4) a deprotection reaction using metal complex;
- (5) a deprotection reaction using an organic metal; and
- (6) a deprotection reaction of silyl.

[0157] The methods from (1) to (4) can be carried out by above described method and the methods of (5) and (6) will be specifically illustrated as follows.

(5) A deprotection reaction using metal is carried out, for example, at the temperature of 0 to 40°C with or without ultrasonic wave in the presence of powdery zinc in an acidic solvent (such as acetic acid, a buffer of pH 4.2 to 7.2 and a mixed solution of a solution thereof with an organic solvent such as tetrahydrofuran).

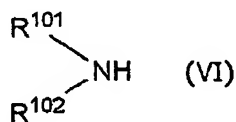
(6) A deprotection reaction of silyl is carried out, for example, at the temperature of 0 to 40°C using tetrabutylammonium fluoride in an organic solvent miscible with water (such as tetrahydrofuran and acetonitrile etc.).

[0158] As persons skilled in the art can easily understand that the aimed compound of the present invention is able to be easily produced by using appropriate ones among those deprotection reactions.

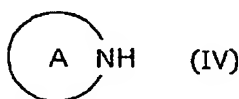
[0159] The reaction can be followed by conversion to a desired non-toxic salt thereof by a known method, if necessary.

[0160] Besides the above-described methods, the compounds of the invention of formula (I) can be produced by using a combination of Examples described in this description, or the conventionally known methods, for example the methods described in *Comprehensive Organic Transformations: A Guide to Functional Group Preparations*, 2nd Edition (Richard C. Larock, John Wiley & Sons Inc, 1999).

[0161] In the above-described processes for the preparation, a compound represented by formula (II) can be prepared using a compound represented by formula (VI)

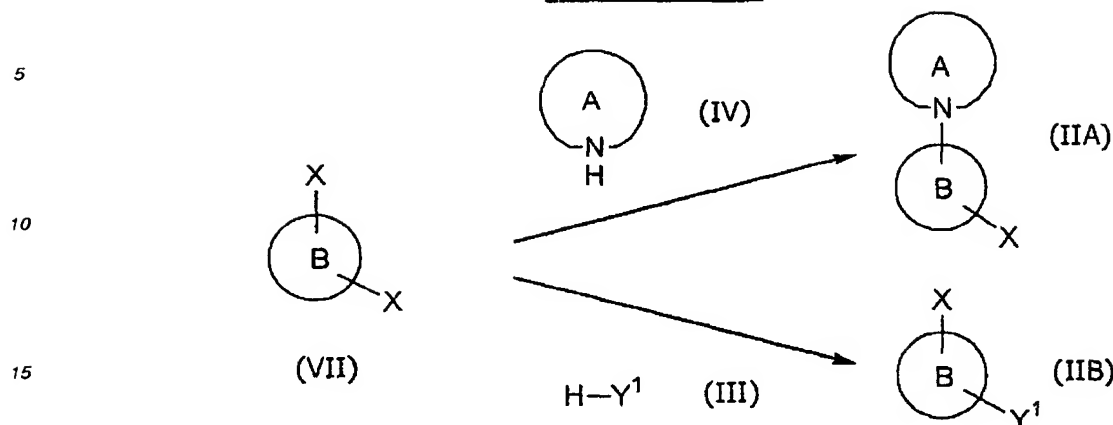


(wherein all symbols have the same meanings as described above.) instead of a compound represented by formula (IV)



(wherein all symbols have the same meanings as described above.).

[0162] In the present invention, the compounds of formulae (IIA) and (IIB) which are used as the starting material can be prepared by the method described in reaction scheme.

reaction scheme

(In the reaction scheme, all symbols have the same meaning as described above.)

[0163] The compounds of formulae (III), (IV), (V), (VI) and (VII) used in the present invention are known compounds or can be prepared easily by known methods, for example the methods described in *Comprehensive Organic Transformations: A Guide to Functional Group Preparations*, 2nd Edition (Richard C. Larock, John Wiley & Sons Inc, 1999).

[0164] In each reaction of the specification, the reactions with heating, as will be apparent to those skilled in the art, it may be carried with water bath, oil bath, sand bath and microwave.

[0165] In each reaction of the specification, it may be used a solid phase reagent which is supported by polymer (for example, polystyrene, polyacrylamide, polypropylene or polyethyleneglycol *etc.*).

[0166] In each reaction of the specification, the obtained products may be purified by conventional techniques. For example, the purification may be carried out by distillation at atmospheric or reduced pressure, by high performance liquid chromatography with silica gel or magnesium silicate, by thin layer chromatography, by ion-exchange resin, by scavenger resin, by column chromatography, by washing or by recrystallization. The purification may be done each reaction or after several reactions.

Toxicity:

[0167] The toxicity of the compounds of the present invention represented by formulae (I) and (II), salts thereof, N-oxides thereof or solvates thereof, or prodrugs thereof are very low and therefore the compounds may be considered safe for pharmaceutical use.

Application to pharmaceuticals

[0168] Since the compounds of the present invention represented by formulae (I) and (II), salts, N-oxides or solvates thereof, or prodrugs thereof have a CXCR4-regulating effect, they are effective in treatment and prevention, for example, of an inflammatory/immune disease, allergic disease, infectious disease, especially HIV infection and accompanying diseases, psychoneurotic disease, cerebral disease, cardiovascular disease, metabolic disease and cancerous disease. In addition, it is also useful in the *in vitro* or *in vivo* amplification of stem cells for a gene therapy as well as in the regeneration medicine for the purpose of peripheral blood stem cell recruitment and tissue repair. Among such a regeneration medicine, it is useful as a transplantation medicine agent employed in bone marrow transplantation, peripheral blood stem cell transplantation and tissue repair.

[0169] The inflammatory/immune diseases include, for example, rheumatoid arthritis, arthritis, gout, transplanted organ rejection, graft versus host disease (GVHD), nephritis, psoriasis, rhinitis, conjunctivitis, multiple sclerosis, ulcerative colitis, Crohn's disease, shock accompanied with bacterial infection, pulmonary fibrosis, systemic response syndrome (SIRS), acute pulmonary disorder, diabetes and the like.

[0170] The allergic diseases include, for example, asthma, atopic dermatitis, rhinitis, conjunctivitis and the like.

[0171] The infectious diseases, especially HIV infection and accompanying diseases, include, for example, acquired immunodeficiency syndrome (AIDS), candidosis, carinii pneumonia, cytomegalovirus retinitis, Kaposi's sarcoma, malignant lymphoma, AIDS encephalopathy, bacterial sepsis and the like.

[0172] The psychoneurotic diseases and the cerebral diseases include, for example, dementia such as Alzheimer's

disease, Parkinson's disease, cerebral stroke, cerebral infarction, epilepsy, schizophrenia, peripheral nervous disorder and the like.

[0173] The cardiovascular diseases include, for example, arteriosclerosis, ischemic reperfusion injury, hypertension, myocardial infarction, angina pectoris, cardiac insufficiency and the like.

[0174] The metabolic diseases include, for example, diabetes, osteoporosis, prostatic hypertrophy, pollakiuria and the like.

[0175] The cancerous diseases include, for example, mammary cancer, malignant tumor such as malignant lymphoma, cancer metastasis, post-radiotherapy/chemotherapy bone marrow suppression or thrombocytopenia and the like.

[0176] The compounds of the present invention of formulae (I) and (II), the salts thereof, the N-oxides thereof or the solvates thereof, or the prodrugs thereof may be administered as a combined preparation by combining with other pharmaceuticals for the purpose of

- 1) supplementing and/or enhancing of prevention and/or treatment effect of the compound,
- 2) improvement in pharmacokinetics and absorption and reduction of dose of the compound, and/or
- 3) reduction of side effect of the compound.

[0177] The combined preparation of the compounds of the present invention of formulae (I) and (II), the salts thereof, the N-oxides thereof or the solvates thereof, or the prodrugs thereof with other pharmaceuticals may be administered in a form of a compounded agent in which both components are compounded in a preparation or may be in a form in which they are administered by means of separate preparations. The case of administration by means of separate preparations includes a simultaneous administration and administrations with time difference. In the case of administrations with time difference, the compound of the present invention of formulae (I) and (II) may be firstly administered followed by administering the other pharmaceutical or the other pharmaceutical may be administered firstly followed by administering the compound of the present invention of formulae (I) and (II). Methods for each of the administration are the same or different.

[0178] There is no particular limitation for the diseases showing prevention and/or treatment effect by the above-mentioned combined preparation, so far as it is a disease in which the prevention and/or treatment effect of the compound of present invention of formulae (I) and (II) are supplemented and/or enhanced.

[0179] Other agent for preventive and/or treating HIV infection and acquired immunodeficiency syndrome used for a combination with the compounds of the present invention of formulae (I) and (II), the salts thereof, the N-oxides thereof or the solvates thereof, or the prodrugs thereof are reverse transcriptase inhibitor, protease inhibitor, chemokine (such as CCR2, CCR3, CCR4, CCR5 and CXCR4) antagonist, fusion inhibitor, antibody to surface antigen of HIV-1 and vaccine of HIV-1 *etc.*

[0180] Reverse transcriptase inhibitors are concretely (1) nucleoside/nucleotide reverse transcriptase inhibitors : zidovudine (brand name: Retrovir), didanosine (brand name: Videx), zalcitabine (brand name: HIVID), stavudine (brand name: Zerit), lamivudine (brand name: Epivir), abacavir (brand name: Ziagen), adefovir, dipivoxil, emtricitabine (brand name: Coviracil) or Tenofovir (brand name: Viread) *etc.* and (2) nonnucleoside reverse transcriptase inhibitors : nevirapine (brand name: Viramune), delavirdine (brand name: Rescriptor), efavirenz (brand name: Sustiva, Stocklin) or capravirine (AG1549) *etc.*

[0181] Protease inhibitors are concretely indinavir (brand name: Crixivan), ritonavir (brand name: Norvir), nelfinavir (brand name: Viracept), saquinavir (brand name: Invirase, Fortovase), amprenavir (brand name: Agenerase), lopinavir (brand name: Kaletra) or tipranavir *etc.*

[0182] As chemokine antagonists, internal ligand of chemokine receptor, its derivatives, its non-peptide low molecular compound or antibody of chemokine receptor are included.

[0183] The examples of internal ligand of chemokine receptor are concretely, MIP-1 α , MIP-1 β , RANTES, SDF-1 α , SDF-1 β , MCP-1, MCP-2, MCP-4, Eotaxin and MDC *etc.*

[0184] The derivatives of internal ligand are concretely, AOP-RANTES, Met-SDF-1 α , Met-SDF-1 β *etc.*

[0185] Antibodies of chemokine receptor are concretely, Pro-140 *etc.*

[0186] CCR2 antagonists are concretely written in specification of WO99/07351, WO99/40913, WO00/46195, WO00/46196, WO00/46197, WO00/46198, WO00/46199, WO00/69432 or WO00/69815 or in Bioorg. Med. Chem. Lett., 10, 1803 (2000) *etc.*

[0187] CCR3 antagonists are concretely written in specification of DE19837386, WO99/55324, WO99/55330, WO00/04003, WO00/27800, WO00/27835, WO00/27843, WO00/29377, WO00/31032, WO00/31033, WO00/34278, WO00/35449, WO00/35451, WO00/35452, WO00/35453, WO00/35454, WO00/35876, WO00/35877, WO00/41685, WO00/51607, WO00/51608, WO00/51609, WO00/51610, WO00/53172, WO00/53600, WO00/58305, WO00/59497, WO00/59498, WO00/59502, WO00/59503, WO00/62814, WO00/73327 or WO01/09088 *etc.*

[0188] CCR4 antagonists are concretely written in specification of WO02/030357 or WO02/030358 *etc.*

[0189] CCR5 antagonists are concretely TAK-779, TAK-220, SCH-D, SCH-C, compounds written in specification of

WO99/17773, WO99/32100, WO00/06085, WO00/06146, WO00/10965, WO00/06153, WO00/21916, WO00/37455, EP1013276, WO00/38680, WO00/39125, WO00/40239, WO00/42045, WO00/53175, WO00/42852, WO00/66551, WO00/66558, WO00/66559, WO00/66141, WO00/68203, JP-A-2000-309598, WO00/51607, WO00/51608, WO00/51609, WO00/51610, WO00/56729, WO00/59497, WO00/59498, WO00/59502, WO00/59503, WO00/76933, WO98/25605 or WO99/04794, WO99/38514 or in *Bioorg. Med. Chem. Lett.*, 10, 1803 (2000) *etc.*

[0190] CXCR4 antagonists are concretely AMD-3100, T-22, KRH-1120, KRH-1636, compounds written in specification of WO00/66112 *etc.*

[0191] Fusion Inhibitors are concretely, T-20 (Pentafuside) and T-1249 *etc.*

[0192] The examples of combination agents written above are intended to illustrate the present invention, but do not limit them.

[0193] The typical examples of the usual the dosage level in clinical trials of reverse transcriptase inhibitors or protease inhibitors written below are intended to illustrate the present invention, but do not limit them.

Zidovudine:	100 mg capsule, 200 mg per dose, 3 times per day; 300 mg tablet, 300 mg per dose, twice per day;
didanosine:	25-200 mg tablet, 125-200 mg per dose, twice per day;
zalcitabine:	0.375-0.75 mg tablet, 0.75 mg per dose, 3 times per day;
stavudine:	15-40 mg capsule, 30-40 mg per dose, twice per day;
lamivudine:	150 mg tablet, 150 mg per dose, twice per day;
abacavir:	300 mg tablet, 300 mg per dose, twice per day;
nevirapine:	200 mg tablet, 200 mg per dose, once per day for 14 days and then twice per day;
delavirdine:	100 mg tablet, 400 mg per dose, 3 times per day;
efavirenz:	50-200 mg capsule, 600 mg per dose, once per day;
indinavir:	200-400 mg capsule, 800 mg per dose, 3 times per day;
ritonavir:	100 mg capsule, 600 mg per dose, twice per day;
nelfinavir:	250 mg tablet, 750 mg per dose, 3 times per day;
saquinavir:	200 mg capsule, 1,200 mg per dose, 3 times per day;
amprenavir:	50-150 mg tablet, 1,200 mg per dose, twice per day.

[0194] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formula (I) or (II) on asthma include antihistamines, antiallergic agents (chemotaxis inhibitors, histamine antagonists, thromboxane synthetase inhibitors, thromboxane antagonists, Th2 cytokine inhibitors), steroids, bronchodilators (xanthine derivatives, sympathetic nerve stimulators, parasympathetic nerve blockers), vaccinating agents, gold formulations, Chinese herb medicines, basic nonsteroidal antiinflammatory agents, 5-lipoxygenase inhibitors, 5-lipoxygenase activating protein inhibitors, leukotriene synthesis inhibitors, prostaglandins, cannabinoid-2 receptor stimulators, antitussives, expectorants and the like.

[0195] The antihistamines include diphenhydramine, diphenylpyraline hydrochloride, diphenylpyraline teoclate, clemastine fumarate, dimenhydrinate, dl-chloropheniramine maleate, d-chloropheniramine maleate, triprolidine hydrochloride, promethazine hydrochloride, alimemazine tartarate, isothipendyl hydrochloride, homochlorcyclizine hydrochloride, hydroxyzine, cyproheptadine hydrochloride, levocabastine hydrochloride, astemizol, bepotastine, desloratadine, TAK-427, ZCR-2060, NIP-530, mometasone furoate, mizolastin, BP-294, andolast, auranofin, acribastine and the like.

[0196] The chemotaxis inhibitors among antiallergic agents include sodium cromoglicate, tranilast, anlexanox, repirinast, ibudilast, pemirolast potassium, tazanolast, nedocromil, cromogricate, Israpafant and the like.

[0197] The histamine antagonists among antiallergic agent include ketotifen fumarate, azelastine hydrochloride, oxatomide, mequitazine, terfenadine, emedastine difumarate, epinastine hydrochloride, ebastine, cetirizine hydrochloride, olopatadine hydrochloride, loratadine, fexofenadine and the like.

[0198] The thromboxane synthetase inhibitors among antiallergic agents include, for example, ozagrel hydrochloride, and imitrodest sodium and the like.

[0199] Examples of the thromboxane receptor antagonist among antiallergic include seratrodest, ramatroban, domitroban calcium dihydrate, and KT-2-962 and the like.

[0200] The Th2 cytokine inhibitors among antiallergic agents include suplastat tosilate and the like.

[0201] Examples of the steroids for external application include clobetasol propionate, diflorasone acetate, fluocinonide, mometasone furoate, betamethasone dipropionate, betamethasone butyrate propionate, betamethasone valerate, difluprednate, budesonide, diflucortolone valerate, amcinonide, halcinonide, dexamethasone, dexamethasone propionate, dexamethasone valerate, dexamethasone acetate, hydrocortisone acetate, hydrocortisone butyrate, hydrocortisone butyrate propionate, deprodone propionate, prednisolone valerate acetate, fluocinolone acetonide, beclomethasone dipropionate, triamcinolone acetonide, flumethasone pivalate, alclometasone dipropionate, clobetasone butyrate, beclomethasone propionate, fludrocortide and the like. The steroid preparations for internal use or injection

include cortisone acetate, hydrocortisone, hydrocortisone sodium phosphate, hydrocortisone sodium succinate, fludrocortisone acetate, prednisolone, prednisolone acetate, prednisolone sodium succinate, prednisolone butylacetate, prednisolone sodium phosphate, halopredone acetate, methyl prednisolone, methyl prednisolone acetate, methyl prednisolone sodium succinate, triamcinolone, triamcinolone acetate, triamcinolone acetonide, dexamethasone, dexamethasone acetate, dexamethasone sodium phosphate, dexamethasone palmitate, paramethasone acetate, betamethasone and the like. The steroid preparations as an inhalant include beclomethasone propionate, fluticasone propionate, budesonide, flunisolide, triamcinolone, ST-126P, ciclesonide, dexamethasone palmitate, mometasone furoate, pras-
 5 terone sulfate, deflazacort, methyl prednisolone sreptanate, methylprednisolone sodium succinate and the like.

[0202] The xanthine derivatives among bronchodilators include aminophylline, theophylline, doxophylline, cipam-
 10 fylline, diprophylline, proxiphylline, cholinetheophylline and the like.

[0203] The sympathetic nerve stimulators among bronchodilators include epinephrine, ephedrine hydrochloride, 1-methylephedrine hydrochloride, methoxyphenamine hydrochloride, isoproterenol sulfate, isoproterenol hydrochlo-
 ride, ciprenaline sulfate, clorprenaline hydrochloride, trimetoquinol hydrochloride, salbutamol sulfate, terbutaline sul-
 fate, hexoprenaline sulfate, tulobuterol hydrochloride, procaterol hydrochloride, fenoterol hydrobromide, formoterol
 15 fumarate, clenbuterol hydrochloride, mabuterol hydrochloride, salmeterol xinafoate, R,R-formoterol, tulobuterol, pir-
 buterol hydrochloride, ritodrine hydrochloride, bambuterol, dopexamin hydrochloride, meluadrine tartrate, ARC68397,
 levosalbutamol, KUR-1246, KUL-7211, AR-C89855, and S-1319 and the like.

[0204] The parasympathetic nerve blockers among bronchodilators include ipratropium bromide, flutropium bromide,
 oxitropium bromide, cimetroplum bromide, temiverine, tiotropium bromide revatropate (UK-112166) and the like.

[0205] The vaccinating agents include paspat, asthremedin, broncasma berna, CS-560 and the like.

[0206] The gold formulations include sodium gold thiomalate and the like.

[0207] The basic nonsteroidal antiinflammatory agents include tiaramide hydrochloride, tinoridine hydrochloride, epi-
 rizole, emorfazone and the like.

[0208] The 5-lipoxygenase inhibitors include zileuton, docebenone, piripost, SCH-40120, WY-50295, E-6700, ML-
 3000, TMK-688, ZD-2138, darbufelone mesylate, R-68151, E-6080, DuP-654, SC-45662, CV-6504, NE-11740, CMI-
 977, NC-2000, E-3040, PD-136095, CMI-392, TZI-41078, Orf-20485, IDB-18024, BF-389, A-78773, TA-270, FLM-
 5011, CGS-23885, A-79175, ETH-615 *etc.*

[0209] The 5-lipoxygenase activating protein inhibitors include MK-591, MK-886 and the like.

[0210] The leukotriene synthesis inhibitors include auranofin, proglumetacin maleate, L-674636, A-81834, UPA-780,
 A-93178, MK-886, REV-5901A, SCH-40120, MK-591, Bay-x-1005, Bay-y-1015, DTI-0026, amlexanox, E-6700 and
 30 the like.

[0211] The prostaglandins (hereinafter abbreviated as "PG") include PG receptor agonist, PG receptor antagonist
 and the like.

[0212] The PG receptor include PGE receptors (EP₁, EP₂, EP₃, EP₄), PGD receptors (DP, CRTH2), PGF receptors
 35 (FP), PGI receptors (IP), TX receptors (TP) and the like.

[0213] The antitussive agents include codeine phosphate, dihydrocodeine phosphate, oxymetebanol, dextrometh-
 orphan hydrobromide, pentoxyverine citrate, dimemorfan phosphate, oxeladin citrate, cloperastine, benproberine
 phosphate, clofedanol hydrochloride, fominoben hydrochloride, noscapine, tipemidine hibenzate, eprazinone hydro-
 chloride, plantago herb extract and the like.

[0214] The expectorants include foeniculated ammonia spirit, sodium hydrogen carbonate, potassium iodide, brom-
 hexine hydrochloride, a cherry tree skin extract, carbocysteine, fudosteine, ambroxol hydrochloride, ambroxol hydro-
 chloride sustained release capsule, methycysteine hydrochloride, acetyl cysteine, ethyl L-cysteine hydrochloride, ty-
 loxapol and the like.

[0215] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the
 45 compound represented by formulae (I) and (II) on atopic dermatitis (urticaria *etc.*) include steroids, nonsteroidal anti-
 inflammatory drugs (NSAID), immunosuppressant agents, prostaglandins, antiallergic agents, mediator releasing de-
 pressants, antihistamine drugs, forskolin preparations, phosphodiesterase inhibitors, cannabinoid-2 receptor stimula-
 tors and the like.

[0216] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the
 50 compound represented by formula (I) on allergic diseases (allergic bronchopulmonary aspergillosis, allergic eosi-
 nophilic gastroenteritis and the like) include antiasthmatic agents, inhalation steroids, inhalation β 2 stimulants, meth-
 ylxanthine-based antiasthmatic agents, antiallergic agents, antiinflammatory agents, anticholinergic agents and the
 like. Those which may also be exemplified include thromboxane antagonists, leukotriene antagonists, LTD4 antago-
 nists, PAF antagonists, phosphodiesterase inhibitors, β 2 agonists, steroids, mediator release inhibitors, eosionophile
 55 chemotaxis inhibitors, macrolide antibiotics, immunosuppressants, desensitizing (allergen) injection formulations and
 the like.

[0217] The antiasthmatic agents include theophylline, procaterol, ketotifen, azelastine and the like.

[0218] The inhalation steroids include beclometasone, fluticasone, budesonide and the like.

[0219] The inhalation β_2 stimulants include fenoterol, salbutamol, formoterol, salmeterol and the like.

[0220] The methylxanthine-based antiasthmatic agents include teophylline and the like.

[0221] The antiallergic agents include ketotifen, terfenazine, azelastine, epinastine, suplastat, sodium cromoglicate and the like.

[0222] The antiinflammatory agents include diclofenac sodium, ibuprofen, indomethacin and the like.

[0223] The anticholinergic agents include ipratropium bromide, flutropium bromide, oxitropium bromide, thiotropium bromide and the like.

[0224] The thromboxane antagonists include ozagrel, seratrovast and the like.

[0225] The leukotriene antagonists include pranlukas, montelukast, zafirlukast, zileuton and the like.

[0226] The macrolide-based antibiotics include erythromycin, roxithromycin and the like.

[0227] The immunosuppressants include ciclosporin, tacrolimus, FTY720 and the like.

[0228] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on hepatitis include liver hydrolysate formulations, polyene phosphatidylcholines, glycyrrizin formulations, protoporphyrin sodium, ursodesoxycholic acid, steroids, anticholinergic agents, antacids, propagermanium, lipid peroxidase inhibitors, mitochondrial benzodiazepine receptor antagonists and the like.

[0229] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on arthritis and rheumatoid arthritis include metalloproteinase inhibitors, immunosuppressants, nonsteroidal anti-inflammatory drugs (NSAID), steroids, prostaglandins, phosphodiesterase inhibitors, cannabinoid-2 receptor stimulants, disease modifying anti-rheumatic drugs (slow-acting anti-rheumatic drug), antiinflammatory enzyme preparations, chondroprotective agents, T-cell inhibitors, TNF α inhibitors, prostaglandin synthase inhibitors, IL-6 inhibitors, interferon gamma agonists, IL-1 inhibitors and the like.

[0230] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on psoriasis include steroids, vitamin D derivatives and the like.

[0231] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on rhinitis include antihistamines, mediator release inhibitors, thromboxane synthetase inhibitors, thromboxane A₂ receptor antagonists, leukotriene receptor antagonists, steroids, α adrenaline receptor stimulants, xanthine derivatives, anticholinergic agents, prostaglandins, nitrogen monoxide synthetase inhibitors, β_2 adrenaline receptor stimulants, phosphodiesterase inhibitors, cannabinoid-2 receptor stimulants and the like.

[0232] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on conjunctivitis include leukotriene receptor antagonists, antihistamines, mediator release inhibitors, nonsteroidal antiinflammatory agents, prostaglandins, steroids, nitrogen monoxide synthetase inhibitors, cannabinoid-2 receptor stimulants and the like.

[0233] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on multiple sclerosis include immunosuppressants, cannabinoid-2 receptor stimulants and the like.

[0234] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on ulcerative colitis include mesalazine, salazosulfapyridine, digestive tract ulcer agents, anticholinergic agents, steroids, 5-lipoxygenase inhibitors, antioxidants, LTB₄ antagonists, local anesthetics, immunosuppressants, defensive factor promoters, MMP inhibitors, mitochondrial benzodiazepine receptor antagonists and the like.

[0235] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on complication of diabetes include sulfonylurea type hypoglycemic agents, biguanide preparations, α -glucosidase inhibitors, fast-acting insulin secretion accelerators, insulin preparations, PPAR agonists, insulin sensitizer without PPAR agonistic activity, beta-3 adrenaline receptor activators, aldose reductase inhibitors, dipeptidyl peptidase IV inhibitors and the like.

[0236] The sulfonylurea agents include acetohexamide, glibenclamide, gliclazide, glycopyramide, chlorpropamide, tolazamide, tolbutamide, glimepiride and the like.

[0237] The biguanide preparations include buformin hydrochloride, metformin hydrochloride and the like.

[0238] The α -glucosidase inhibitors include acarbose, voglibose and the like.

[0239] The fast-acting insulin secretion accelerators include nateglinide, repaglinide and the like.

[0240] The PPAR agonists include pioglitazone, troglitazone, rosiglitazone, JTT-501 and the like.

[0241] The insulin sensitizers having no PPAR agonistic activity include ONO-5816, YM-440 and the like.

[0242] The beta-3 adrenaline receptor activators include AJ9677, L750355, CP331648 and the like.

[0243] The aldose reductase inhibitors include epalrestat, fidarestat, zenarestat and the like.

[0244] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on cancer (malignant tumor) or cancer metastasis include anticancer

agents (MMP inhibitors, alkylating agents (cyclophosphamide, melphalan, thiotepa, mitomycin C, busulfan, procarbazine hydrochloride and the like), metabolism antagonists (methotrexate, mercaptopurine, azathiopurine, fluorouracil, tegafur, cytarabine, azaserine and the like), antibiotics (mitomycin C, bleomycin, peplomycin, doxorubicin hydrochloride, aclarubicin, daunorubicin, actinomycin C), antimitotic agents, platinum complex (cisplatin), plant-derived antima-

5 lignant tumor agents (vincristine sulfate, vinblastin sulfate and the like), antitumor hormones (methyltestosterone, testosterone propionate, testosterone enanthate, mepitiostane, fosfestrol, chlormadinone acetate and the like), immunoactivators (picibanil, krestin and the like), interferons (IFN α , IFN α -2a, IFN α -2b, IFN β , IFN γ -1a and the like) and the like.

[0245] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on immunological diseases (autoimmune diseases, transplantation organ rejections and the like) include immunosuppressants (ciclosporin, tacrolimus, FTY720 and the like).

[0246] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on dementia such as Alzheimer senile dementia include acetylcholine esterase inhibitors, nicotine receptor regulating agents, cerebral circulation and metabolism improving agents, 15 monoamine oxidase inhibitors, vitamin E, aldose reductase inhibitors and the like.

[0247] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on epilepsy include phenytoin, trimetadione, ethosuximide, carbamazepine, phenobarbital, primidone, acetazolamide, sultiamine, sodium valproate, clonazepam, diazepam, nitrazepam and the like.

20 [0248] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) on arteriosclerosis include HMG-CoA reductase inhibitors, fibrate preparations, probucol preparations, anion-exchange resin, EPA preparations, nicotinic acid preparations, MTP inhibitors, other antihypercholesterolemic agents, EDG-2 antagonists and the like.

[0249] Other drugs for supplementation and/or enhancement of the effect of the compound represented by formulae (I) and (II) when employed in regenerative medicines include cytokines, various growth factors, such as various CSF (G-CSF, GM-CSF and the like), various interleukins (IL-3, 6, 7, 11, 12 and the like), EPO, TPO, SCF, FLT3 ligand, MIP-1 α and the like.

[0250] The weight proportion of the compound represented by formulae (I) and (II) and the other pharmaceutical preparations is not specifically limited.

30 [0251] Arbitrary two or more of the other pharmaceutical preparations may be administered in combination.

[0252] Other drugs for supplementation and/or enhancement of the prophylactic and/or therapeutic effect of the compound represented by formulae (I) and (II) include not only those which have so far been found but also those which will be found on the basis of the aforementioned mechanism.

35 [0253] In order to use the compound of the present invention represented by formulae (I) and (II) or the compound represented by formulae (I) and (II) in combination with the other pharmaceutical preparations, these compounds are normally administered to the entire or local part of human body orally or parenterally. It is preferable to select the most effective administration route upon treatment.

[0254] The doses to be administered are determined depending upon, for example, age, body weight, symptom, the desired therapeutic effect, the route of administration, and the duration of the treatment. In the human adult, the doses 40 per person are generally from 1 ng to 100 mg, by oral administration, up to several times per day, and from 0.1 ng to 10 mg, by parenteral administration, up to several times per day, or continuous administration from 1 to 24 hours per day from vein.

[0255] As mentioned above, the doses to be used depend upon various conditions. Therefore, there are cases in which doses lower than or greater than the ranges specified above may be used.

45 [0256] The compound represented by formulae (I) and (II) of the present invention, or concomitant drug combined the compound represented by formulae (I) and (II) with other drugs may be administered in the composition of, for example, solid compositions or liquid compositions, each for oral administration, or injections, external use, suppositories, each for parenteral administration.

[0257] Solid compositions for oral administration include compressed tablets, pills, capsules, dispersible powders 50 and granules. Capsules include hard capsules and soft capsules.

[0258] In such solid forms, one or more of the active compound(s) may be admixed with vehicles (such as lactose, mannitol, glucose, microcrystalline cellulose, starch), binders (such as hydroxypropyl cellulose, polyvinylpyrrolidone or magnesium metasilicate aluminate), disintegrants (such as cellulose calcium glycolate), lubricants (such as magnesium stearate), stabilizing agents, and solution adjuvants (such as glutamic acid or aspartic acid) and prepared 55 according to methods well known in normal pharmaceutical practice. The solid forms may, if desired, be coated with coating agents (such as sugar, gelatin, hydroxypropyl cellulose or hydroxypropylmethyl cellulose phthalate), or be coated with two or more films. And further, coating may include containment within capsules of absorbable materials such as gelatin.

[0259] Liquid forms for oral administration include pharmaceutically acceptable solutions, suspensions and emulsions, syrups and elixirs. In such forms, one or more of the active compound(s) may be dissolved, suspended or emulsified into diluent(s) commonly used in the art (such as purified water, ethanol or a mixture thereof). Besides such liquid forms may also comprise some additives, such as wetting agents, suspending agents, emulsifying agents, sweetening agents, flavoring agents, aroma, preservative or buffering agent.

[0260] Injections for parenteral administration include sterile aqueous, suspensions, emulsions and solid forms which are dissolved or suspended into solvent(s) for injection immediately before use. In injections, one or more of the active compound(s) may be dissolved, suspended or emulsified into solvent(s). The solvents may include distilled water for injection, physiological salt solution, vegetable oil, propylene glycol, polyethylene glycol, alcohol, e.g. ethanol, or a mixture thereof. Injections may comprise some additives, such as stabilizing agents, solution adjuvants (such as glutamic acid, aspartic acid or POLYSORBATE80 (registered trade mark)), suspending agents, emulsifying agents, soothing agent, buffering agents, preservative. They may be sterilized at a final step, or may be prepared by an aseptic manipulation. They may also be manufactured in the form of sterile solid forms, for example, freeze-dried products, which may be dissolved in sterile water or some other sterile diluent(s) for injection immediately before use.

[0261] In the parenteral administration, formulation of external use include, for example, ointment, gel, cream, poultice, patch, liniment, atomized agent, inhalation, spray, aerosol, eye drops and nasal drops, etc. They include one or more of the active compound(s) and be prepared by known method or usual method.

[0262] Ointment is prepared by known method or usual method. For example, it is prepared by levigation or fusion of one or more of the active compound(s) and substrate. The substrate of ointment is selected from known or usual one. For example, higher fatty acid or higher fatty acid ester (adipic acid, myristic acid, palmitic acid, stearic acid, oleic acid, adipic acid ester, myristic acid ester, palmitic acid ester, stearic acid ester, oleic acid ester, etc.), wax (yellow beeswax, Spermaceti, ceresin, etc.), surfactant (polyoxyethylene alkyl ether phosphoric acid ester, etc.), higher alcohol (cetanol, stearyl alcohol, cetostearyl alcohol, etc.), silicon oil (dimethyl polysiloxane, etc.), hydrocarbon (hydrophilic petrolatum, white petrolatum, purified lanolin, light liquid paraffin, etc.), glycol (ethylene glycol, diethylene glycol, propylene glycol, polyethylene glycol, macrogol, etc.), vegetable oil (castor oil, olive oil, sesame oil, turpentine oil, etc.), animal oil (mink oil, egg yolk oil, squalane, squalene, etc.), water, absorption accelerator, skin fit inhibitor, etc. are used as single substance selected from them or mixture which consists of two or more kinds that is selected from them. Moreover, humectant, preservative agent, stabilizer, antioxidative agent, fragrant materials, etc. may be contained.

[0263] Gel is prepared by known method or usual method. For example, it is prepared by fusion of one or more of the active compound(s) and substrate. The substrate of gel is selected from known or usual one. For example, lower alcohol (ethanol, isopropylalcohol, etc.), gelling agent (carboxy methyl cellulose, hydroxy ethyl cellulose, hydroxy propyl cellulose, ethyl cellulose, etc.), neutralizing agent, (triethanolamine, diisopropanolamine, etc.), surfactant, (polyethylene glycol monostearate, etc.), gum, water, absorption accelerator, skin fit inhibitor, etc. are used as single substance selected from them or mixture which consists of two or more kinds that is selected from them. Moreover, preservative agent, antioxidative agent, fragrant materials, etc. may be contained.

[0264] Cream is prepared by known method or usual method. For example, it is prepared by fusion or emulsification of one or more of the active compound(s) and substrate. The substrate of cream is selected from known or usual one. For example, higher fatty acid ester, lower alcohol, hydrocarbon, polyalcohol (propylene glycol, 1,3-butylene glycol, etc.), higher alcohol (2-hexyldecanol, cetanol, etc.), emulsifying agent (polyoxyethylene alkyl ether, fatty acid ester, etc.), water, absorption accelerator, skin fit inhibitor, etc. are used as single substance selected from them or mixture which consists of two or more kinds that is selected from them. Moreover, preservative agent, antioxidative agent, fragrant materials, etc. may be contained.

[0265] Poultice is prepared by known method or usual method. For example, it is prepared by fusion of one or more of the active compound(s) and substrate, and then the kneaded one is laid over support medium. The substrate for poultice is selected from known or usual one. For example, thickening agent (polyacrylic acid, polyvinylpyrrolidone, gum acacia, starch, gelatin, methyl cellulose, etc.), bulking agent (kaolin, zinc oxide, talc, calcium, magnesium, etc.), water, solubilizing agent, thickener, skin fit inhibitor, etc. are used as single substance selected from them or mixture which consists of two or more kinds that is selected from them. Moreover, preservative agent, antioxidative agent, fragrant materials, etc. may be contained.

[0266] Patch is prepared by known method or usual method. For example, it is prepared by fusion of one or more of the active compound(s) and substrate, and then laid over support medium. The substrate for patch is selected from known or usual one. For example, polymer substrate, fat, higher fatty acid, thickener, skin fit inhibitor, etc. are used as single substance selected from them or mixture which consists of two or more kinds that is selected from them. Moreover, preservative agent, antioxidative agent, fragrant materials, etc. may be contained.

[0267] Liniment is prepared by known method or usual method. For example, one or more of the active compound(s) may be dissolved, suspended or emulsified in water, alcohol (ethanol, polyethylene glycol, etc.), higher fatty acid, glycerin, soap, emulsifying agent, suspending agent, etc. as single substance selected from them or mixture which consists of two or more kinds that is selected from them. Moreover, preservative agent, antioxidative agent, fragrant

materials, etc. may be contained.

[0268] Atomized agent, inhalation and spray may comprise in addition to a diluent, a stabilizer such as sodium bisulfite and an isotonicization buffer such as sodium chloride, sodium citrate or citric acid. The preparation process of sprays is described in detail in, for example, U.S. Patent Nos. 2,868,691 and 3,095,355.

[0269] In case of administration of nasal drops, they may be usually sprayed intranasally in the form of liquid or powder comprising drugs with a special apparatus for nasal drops or nebulizer quantitatively.

[0270] The eye drops for parenteral administration may be in the form of liquid, suspension, emulsion or ointment or may be dissolved in a solvent in use.

[0271] These eye drops are prepared by any known method. For example, one or more active materials are dissolved, suspended or emulsified in a solvent. As such a solvent for eye drops there may be used sterilized purified water, physiological saline and other aqueous or nonaqueous solvents (e.g., vegetable oil), singly or in combination. The eye drops may comprise an isotonic agent (e.g., sodium chloride, concentrated glycerin), a buffering agent (e.g., sodium phosphate, sodium acetate), a surface active agent (e.g., Polysolvate 80 (trade name), polyoxyl stearate 40, polyoxyethylene-hardened castor oil), a stabilizer (sodium citrate, sodium edetate), a preservative (e.g., benzalkonium chloride, Paraben), etc. properly selectively as necessary. The eye drops are sterilized at the final step or prepared by an aseptic manipulation. Alternatively, an aseptic solid agent such as freeze-dried product which has previously been prepared may be rendered aseptic or dissolved in an aseptic distilled water for injection or other solvent before use.

[0272] The dosage of inhalations for parenteral administration include aerosol, powders for inhalation or liquids for inhalation. The liquids for inhalation may be dissolved or suspended in water or the other appropriate solvent as needed.

[0273] Such inhalations are prepared in a known method.

[0274] For example, a liquid for inhalation is prepared by selecting proper additives from an antiseptic (such as benzalkonium chloride or p-aminobenzoic acid), a coloring agent, a buffering agent (such as sodium phosphate or sodium acetate), an isotonicizing agent (such as sodium chloride or concentrated glycerin), thickening agent (such as carboxyvinylpolymer), or an accelerator of absorption, etc., if necessary.

[0275] A powder for inhalation is prepared by selecting proper additives from a lubricant agent (such as stearin acid and the salt thereof), a binding agent, (such as starch, dextrin), a diluting agent (such as lactose, cellulose), a coloring agent, an antiseptic (such as benzalkonium chloride or p-aminobenzoic acid), an accelerator of absorption, etc., if necessary.

[0276] In case of administration of liquid for inhalation, spray (atomizer, nebulizer) is usually used and in case of administration of powder for inhalation, inhalation administration apparatus for powder agents is usually used.

[0277] The other compositions for parenteral administration include suppositories for intrarectal administration and pessaries for vaginal administration which comprise one or more of the active substance(s) and may be prepared by methods known per se.

BEST MODE FOR CARRYING OUT THE INVENTION

[0278] The present invention is explained below in detail based on Reference Examples and Examples, but the present invention is not limited thereto.

[0279] All the compounds described in the present specification were named according to IUPAC nomenclature system or named using ACD/Name (ver. 6.0, Advanced Chemistry Development Inc.).

[0280] The solvents in the parentheses show the developing solvents or eluting solvents and the ratios of the solvents used are by volume in chromatographic separations or TLC. The solvents in the parentheses in NMR show the solvents for measurement. Electrospray ionization (ESI, condition : Pos., 20 V) was used as a method of Mass measurement.

[0281] HPLC condition is outlined below.

(1) Condition A (analysis)

Used equipment: Waters LC/MS

Column : Xterra (registered trade name) MS C₁₈, 5 μ m, 4.6 x 50 mm I.D.

Flow rate : 3 mL/min

Solvent: Liquid A : 0.1% trifluoroacetic acid aqueous solution

Liquid B : 0.1% trifluoroacetic acid - acetonitrile solution

Time (min.)	liquid A	Liquid B
0	95	5
0.5	95	5

EP 1 571 146 A1

(continued)

Time (min.)	liquid A	Liquid B
3	0	100
3.5	0	100
3.51	95	5
5	95	5

(2) Condition B (analysis)

Used equipment: Waters LC/MS

Column : Xterra (registered trade name) MS C₁₈, 5 µm, 4.6 x 50 mm I.D.

Flow rate : 3 mL/min

Solvent : Liquid A : 0.1% triethylamine aqueous solution

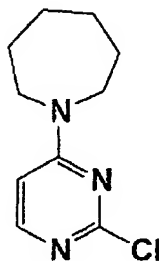
Liquid B : 0.1% triethylamine - acetonitrile solution

Time (min.)	Liquid A	Liquid B
0	95	5
0.5	95	5
3	0	100
3.5	0	100
3.51	95	5
7	95	5

Reference Example 1

2-chloro-4-(perhydroazepin-1-yl)pyrimidine

[0282]



[0283] To a solution of 2,4-dichloropyrimidine (3.0 g) in tetrahydrofuran (50 mL) were added triethylamine (4.2 mL) and perhydroazepine (2.5 mL) with ice cooling and the mixture was stirred for 1 hour at room temperature. To the reaction mixture was added water (30 mL) and the resulting mixture was concentrated. The residue was extracted with methylene chloride three times. The organic layer was washed with brine, dried over anhydrous magnesium sulfate and concentrated. The residue was purified by column chromatography on silica gel (hexane : ethyl acetate = 5 : 1 → 2 : 1) to give the title compound (3.03 g) having the following physical data.

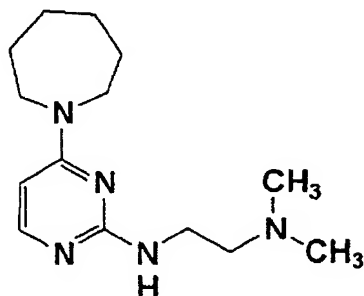
TLC : R_f 0.18 (hexane : ethyl acetate = 3 : 1);

NMR (CDCl₃) : δ 1.53 (m, 4H), 1.78 (m, 4H), 3.44 (m, 2H), 3.83 (m, 2H), 6.29 (d, J = 6.32 Hz, 1H), 7.96 (d, J = 6.32 Hz, 1H).

Example 1

2-(2-dimethylaminoethylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0284]



[0285] A mixture of the compound prepared in Reference Example 1 (1.5 g) and N,N-dimethylethylenediamine (1.56 mL) was stirred for 16 hour at 90°C. The reaction mixture was cooled and purified by column chromatography on silica gel (ethyl acetate : methanol : triethylamine = 10 : 1 : 0 → 10 : 1 : 0.2) to give the title compound (1.44 g) having the following physical data.

crystalline powder : melting point 53.0-54.5°C;

TLC : R_f 0.30 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO-d₆, 363.1K) : δ 1.50 (m, 4H), 1.70 (m, 4H), 2.19 (s, 6H), 2.42 (t, J = 6.00 Hz, 2H), 3.33 (q, J = 6.00 Hz, 2H), 3.56 (m, 4H), 5.74 (m, 1H), 5.83 (d, J = 6.00 Hz, 1H), 7.72 (d, J = 6.00 Hz, 1H).

Example 1(1) to Example 1(47)

[0286] By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds, the compounds of the present invention having the following physical data were given.

Example 1(1)

2-[3-(imidazol-1-yl)propylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0287] TLC : R_f 0.66 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO-d₆) : δ 1.49 (m, 4H), 1.69 (m, 4H), 1.97 (m, 2H), 3.24 (m, 2H), 3.54 (m, 4H), 4.01 (t, J = 7.00 Hz, 2H), 5.84 (d, J = 6.04 Hz, 1H), 6.12 (m, 1H), 6.86 (d, J = 1.24 Hz, 1H), 7.10 (d, J = 1.24 Hz, 1H), 7.56 (s, 1H), 7.73 (d, J = 6.04 Hz, 1H).

Example 1(2)

2-(2-dimethylaminopropylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0288] TLC : R_f 0.57 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO-d₆, 363.1K) : δ 0.91 (d, J = 6.59 Hz, 3H), 1.50 (m, 4H), 1.69 (m, 4H), 2.20 (s, 6H), 2.72 (m, 1H), 3.20 (m, 2H), 3.55 (t, J = 6.00 Hz, 4H), 5.67 (m, 1H), 5.83 (d, J = 5.77 Hz, 1H), 7.72 (d, J = 5.77 Hz, 1H).

Example 1(3)

4-(2-dimethylaminoethylamino)-2-pyrrolidinopyrimidine

[0289] TLC : R_f 0.29 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO-d₆) : δ 1.84 (m, 4H), 2.17 (s, 6H), 2.38 (t, J = 6.73 Hz, 2H), 3.37 (m, 6H), 5.70 (d, J = 5.50 Hz, 1H), 6.77 (m, 1H), 7.64 (d, J = 5.50 Hz, 1H).

Example 1(4)

4-(2-dimethylaminoethylamino)-2-(perhydroazocin-1-yl)pyrimidine

- 5 **[0290]** TLC : Rf 0.38 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.43 (m, 6H), 1.69 (m, 4H), 2.15 (s, 6H), 2.36 (t, J = 6.73 Hz, 2H), 3.32 (m, 2H), 3.58 (m, 4H),
 5.68 (d, J = 5.50 Hz, 1H), 6.77 (m, 1H), 7.65 (d, J = 5.50 Hz, 1H).

Example 1(5)

10

4-(2-dimethylaminoethylamino)-2-piperidinopyrimidine

- [0291]** TLC : Rf 0.44 (chloroform: methanol: 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.44 (m, 4H), 1.56 (m, 2H), 2.15 (s, 6H), 2.35 (t, J = 6.00 Hz, 2H), 3.33 (m, 2H), 3.63 (t, J = 6.00
 15 Hz, 4H), 5.70 (d, J = 5.77 Hz, 1H), 6.76 (s, 1H), 7.66 (d, J = 5.77 Hz, 1H).

Example 1(6)

20

2-(2-dimethylamino-1-methylethylamino)-4-(perhydroazepin-1-yl)pyrimidine

- [0292]** TLC : Rf 0.52 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (CD₃OD) : δ 1.18 (d, J = 6.32 Hz, 3H), 1.55 (m, 4H), 1.76 (m, 4H), 2.28 (m, 7H), 2.51 (m, 1H), 3.58 (m, 4H), 4.15
 (m, 1H), 5.90 (d, J = 6.04 Hz, 1H), 7.67 (d, J = 6.04 Hz, 1H).

25 Example 1(7)

4-(2-dimethylaminoethylamino)-2-(4-methylpiperazin-1-yl)pyrimidine

- [0293]** NMR (DMSO- d_6) : δ 2.20 (s, 3H), 2.26 (s, 6H), 2.32 (m, 4H), 3.30 (m, 4H), 3.63 (m, 4H), 5.76 (d, J = 5.20 Hz,
 30 1H), 6.91 (m, 1H), 7.69 (d, J = 5.20 Hz, 1H);
 MS (m/z) : 265 (M + H)⁺;
 HPLC retention time (min) : 2.83; HPLC condition: B.

Example 1(8)

35

4-(2-dimethylaminoethylamino)-2-(4-phenylpiperazin-1-yl)pyrimidine

- [0294]** MS (m/z) : 327 (M + H)⁺;
 HPLC retention time (min) : 3.51; HPLC condition : B.

40

Example 1(9)

2-(4-benzylpiperazin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

- [0295]** MS (m/z) : 341 (M + H)⁺;
 HPLC retention time (min) : 3.42; HPLC condition : B.

Example 1(10)

50 2-(4-acetylpiperazin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

- [0296]** MS (m/z) : 293 (M + H)⁺;
 HPLC retention time (min) : 2.78; HPLC condition : B.

55

Example 1(11)

4-(2-dimethylaminoethylamino)-2-(4-hydroxypiperidin-1-yl)pyrimidine

5 [0297] MS (m/z) : 266 (M + H)⁺;
HPLC retention time (min) : 2.76; HPLC condition : B.

Example 1(12)

10 4-(2-dimethylaminoethylamino)-2-(4-methylpiperidin-1-yl)pyrimidine

[0298] MS (m/z) : 264 (M + H)⁺;
HPLC retention time (min) : 3.49; HPLC condition : B.

15 Example 1(13)

4-(2-dimethylaminoethylamino)-2-(3-methylpiperidin-1-yl)pyrimidine

20 [0299] MS (m/z) : 264 (M + H)⁺;
HPLC retention time (min) : 3.46; HPLC condition : B.

Example 1(14)

25 4-(2-dimethylaminoethylamino)-2-(2-methylpiperidin-1-yl)pyrimidine

[0300] MS (m/z) : 264 (M + H)⁺;
HPLC retention time (min) : 2.89; HPLC condition : B.

Example 1(15)

30 2-(3-hydroxypyrrolidin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

[0301] MS (m/z) : 252 (M + H)⁺;
HPLC retention time (min) : 2.70; HPLC condition : B.

35 Example 1(16)

2-(4-ethoxycarbonylpiperidin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

40 [0302] MS (m/z) : 322 (M + H)⁺;
HPLC retention time (min) : 3.31; HPLC condition : B.

Example 1(17)

45 2-(3-ethoxycarbonylpiperidin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

[0303] MS (m/z) : 322 (M + H)⁺;
HPLC retention time (min) : 3.33; HPLC condition : B.

50 Example 1(18)

2-thiomorpholino-4-(2-dimethylaminoethylamino)pyrimidine

55 [0304] MS (m/z) : 268 (M + H)⁺;
HPLC retention time (min) : 3.18; HPLC condition : B.

Example 1(19)

4-(2-dimethylaminoethylamino)-2-morpholinopyrimidine

[0305] MS (m/z) : 252 (M + H)⁺;
HPLC retention time (min) : 2.83; HPLC condition : B.

Example 1(20)

2-(4-carbamoylpiperidin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

[0306] MS (m/z) : 585 (2M + H)⁺, 293 (M + H)⁺;
HPLC retention time (min) : 2.72; HPLC condition : B.

Example 1(21)

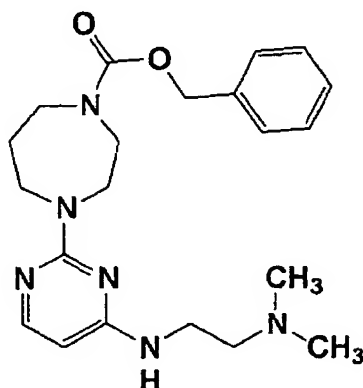
2-(3-carbamoylpiperidin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

[0307] MS (m/z) : 293 (M + H)⁺;
HPLC retention time (min) : 2.78; HPLC condition : B.

Example 1(22)

2-(4-benzyloxycarbonyl-1,4-perhydrodiazepin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

[0308]



MS (m/z) : 797 (2M + H)⁺, 399 (M + H)⁺;
HPLC retention time (min) : 3.44; HPLC condition : B.

Example 1(23)

2-(4-benzyl-1,4-perhydrodiazepin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

[0309] MS (m/z) : 355 (M + H)⁺;
HPLC retention time (min) : 3.47; HPLC condition : B.

Example 1(24)

4-(2-dimethylaminoethylamino)-2-(perhydroquinolin-1-yl)pyrimidine

[0310] MS (m/z) : 304 (M + H)⁺;

EP 1 571 146 A1

HPLC retention time (min) : 3.84; HPLC condition : B.

Example 1(25)

4-(2-dimethylaminoethylamino)-2-(perhydroisoquinolin-2-yl)pyrimidine

[0311] MS (m/z) : 304 (M + H)⁺;
HPLC retention time (min) : 3.86; HPLC condition : B.

Example 1(26)

4-(2-dimethylaminoethylamino)-2-(4-methyl-1,4-perhydrodiazepin-1-yl)pyrimidine

[0312] MS (m/z) : 279 (M + H)⁺;
HPLC retention time (min) : 2.90; HPLC condition : B.

Example 1(27)

4-(2-dimethylaminoethylamino)-2-(4-propylpiperidin-1-yl)pyrimidine

[0313] MS (m/z) : 292 (M + H)⁺;
HPLC retention time (min) : 3.89; HPLC condition : B.

Example 1(28)

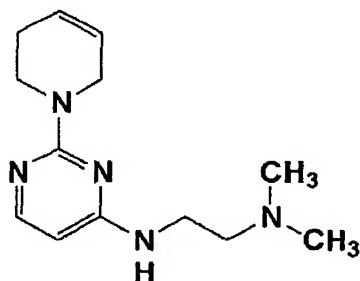
2-(4-butylpiperazin-1-yl)-4-(2-dimethylaminoethylamino)pyrimidine

[0314] MS (m/z) : 307 (M + H)⁺;
HPLC retention time (min) : 3.34; HPLC condition : B.

Example 1(29)

4-(2-dimethylaminoethylamino)-2-(1,2,3,6-tetrahydropyridin-1-yl)pyrimidine

[0315]



MS (m/z): 248 (M + H)⁺;
HPLC retention time (min) : 3.25; HPLC condition : B.

Example 1(30)

4-(2-dimethylaminoethylamino)-2-(3,5-dimethylpiperidin-1-yl)pyrimidine

[0316] MS (m/z) : 278 (M + H)⁺;
HPLC retention time (min) : 3.67; HPLC condition : B.

Example 1(31)

4-(2-dimethylaminoethylamino)-2-(perhydroazepin-1-yl)pyrimidine

- 5 **[0317]** TLC : Rf 0.41 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 7.65 (brd, J = 5.7 Hz, 1H), 6.72 (br, 1H), 5.68 (d, J = 5.7 Hz, 1H), 3.61 (m, 4H), 3.30 (m, 2H), 2.36 (t, J = 6.9 Hz, 2H), 2.15 (s, 6H), 1.65 (m, 4H), 1.44 (m, 4H).

Example 1 (32)

10

2-(3-dimethylaminopropylamino)-4-pyrrolidinopyrimidine

- [0318]** TLC : Rf 0.19 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.60 (m, 2H), 1.87 (m, 4H), 2.10 (s, 6H), 2.22 (t, J = 7.14 Hz, 2H), 3.20 (m, 2H), 3.38 (m, 4H),
 15 5.66 (d, J = 5.77 Hz, 1H), 6.37 (m, 1H), 7.70 (d, J = 5.77 Hz, 1 H).

Example 1(33)

20

2-(3-dimethylaminopropylamino)-4-piperidinopyrimidine

- [0319]** TLC : Rf 0.28 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.46 (m, 4H), 1.60 (m, 4H), 2.11 (s, 6H), 2.22 (t, J = 7.14 Hz, 2H), 3.18 (m, 2H), 3.49 (m, 4H), 5.95 (d, J = 6.04 Hz, 1H), 6.41 (m, 1H), 7.72 (d, J = 6.04 Hz, 1H).

25 Example 1(34)

2-(3-dimethylaminopropylamino)-4-(perhydroazepin-1-yl)pyrimidine

- [0320]** TLC : Rf 0.19 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 30 NMR (DMSO- d_6) : δ 1.44 (m, 4H), 1.61 (m, 6H), 2.09 (s, 6H), 2.21 (t, J = 7.14 Hz, 2H), 3.18 (q, J = 6.59 Hz, 2H), 3.51 (m, 4H), 5.81 (d, J = 6.04 Hz, 1H), 6.41 (m, 1H), 7.70 (d, J = 6.04 Hz, 1H).

Example 1(35)

35 2-(2-dimethylaminoethylamino)-4-pyrrolidinopyrimidine

- [0321]** TLC : Rf 0.20 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.87 (m, 4H), 2.15 (s, 6H), 2.36 (t, J = 6.73 Hz, 2H), 3.35 (m, 6H), 5.68 (d, J = 5.77 Hz, 1H), 6.14 (m, 1H), 7.71 (d, J = 5.77 Hz, 1H).

40

Example 1 (36)

2-(2-dimethylaminoethylamino)-6-methyl-4-(perhydroazepin-1-yl)pyrimidine

- 45 **[0322]** TLC : Rf 0.30 (chloroform : methanol : triethylamine = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.45 (m, 4H), 1.67 (m, 4H), 2.05 (s, 3H), 2.19 (s, 6H), 2.41 (t, J = 6.90 Hz, 2H), 3.29 (m, 2H), 3.65 (m, 4H), 5.73 (s, 1H), 6.15 (m, 1H).

Example 1(37)

50

2-(2-dimethylaminoethylamino)-5-methyl-4-(perhydroazepin-1-yl)pyrimidine

- [0323]** TLC : Rf 0.32 (chloroform : methanol : triethylamine = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.47 (m, 4H), 1.69 (m, 4H), 2.08 (s, 3H), 2.14 (s, 6H), 2.34 (t, J = 6.60 Hz, 2H), 3.25 (td, J = 6.60,
 55 6.00 Hz, 2H), 3.60 (t, J = 6.00 Hz, 4H), 6.00 (m, 1H), 7.52 (s, 1H).

Example 1(38)

2-(1-benzylpiperidin-4-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0324] TLC : Rf 0.52 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6 , 363.1K) : δ 1.49 (m, 6H), 1.68 (m, 4H), 1.87 (m, 2H), 2.07 (td, J = 11.47, 2.61 Hz, 2H), 2.77 (m, 2H), 3.46 (s, 2H), 3.54 (t, J = 6.00 Hz, 4H), 3.66 (m, 1H), 5.74 (m, 1H), 5.82 (d, J = 6.04 Hz, 1H), 7.25 (m, 5H), 7.72 (d, J = 6.04 Hz, 1H).

Example 1(39)

2-(2-morpholinoethylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0325] TLC : Rf 0.41 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.45 (m, 4H), 1.68 (m, 4H), 2.38 (m, 6H), 3.30 (q, J = 6.00 Hz, 2H), 3.57 (m, 8H), 5.83 (d, J = 5.70 Hz, 1H), 6.19 (m, 1H), 7.71 (d, J = 5.70 Hz, 1H).

Example 1(40)

4-(perhydroazepin-1-yl)-2-(2-pyrrolidinoethylamino)pyrimidine

[0326] TLC : Rf 0.23 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6 , 363.1K) : δ 1.51 (m, 4H), 1.74 (m, 8H), 2.69 (m, 4H), 2.75 (t, J = 6.60 Hz, 2H), 3.42 (m, 2H), 3.56 (m, 4H), 5.86 (d, J = 6.00 Hz, 1H), 5.99 (m, 1H), 7.73 (d, J = 6.00 Hz, 1H).

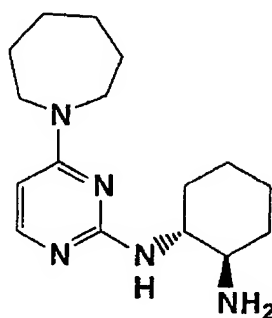
Example 1(41)

2-(2-aminoethylamino)-4-(perhydroazepin-1-yl)pyrimidine dihydrochloride crystalline powder : melting point 100-102°C;

[0327] TLC : Rf 0.16 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (CD $_3$ OD) : δ 1.61 (m, 4H), 1.85 (m, 4H), 3.22 (t, J = 6.00 Hz, 2H), 3.70 (m, 2H), 3.75 (t, J = 6.00 Hz, 2H), 3.93 (m, 2H), 6.44 (d, J = 7.70 Hz, 1H), 7.72 (d, J = 7.70 Hz, 1H).

Example 1(42)

(±)-2-[(1R*,2R*)-2-aminocyclohexylamino]-4-(perhydroazepin-1-yl)pyrimidine

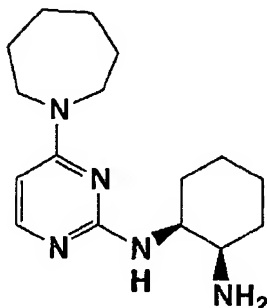
[0328]

TLC : Rf 0.23 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.11 (m, 4H), 1.45 (m, 4H), 1.62 (m, 6H), 1.81 (m, 1H), 1.97 (m, 1H), 3.37 (m, 6H), 5.82 (d, J = 5.80 Hz, 1H), 6.19 (m, 1H), 7.70 (d, J = 5.80 Hz, 1H).

Example 1(43)

(±)-2-[(1S*,2R*)-2-aminocyclohexylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0329]



TLC : Rf 0.19 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO-d₆) : δ 1.25 (m, 2H), 1.47 (m, 10H), 1.68 (m, 4H), 2.96 (m, 1H), 3.37 (m, 4H), 3.73 (m, 1H), 5.83 (d, J = 5.80 Hz, 1H), 5.91 (m, 1H), 7.71 (d, J = 5.80 Hz, 1H).

Example 1(44)

2-(2-dimethylaminoethylamino)-4-(perhydroquinolin-1-yl)pyrimidine

[0330] TLC : Rf 0.50 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO-d₆, 373.1K) : δ 1.37 (m, 6H), 1.60 (m, 2H), 1.80 (m, 5H), 2.62 (s, 6H), 2.84 (m, 1H), 2.98 (m, 2H), 3.54 (m, 2H), 4.16 (m, 1H), 4.36 (m, 1H), 6.08 (d, J = 6.32 Hz, 1H), 6.74 (m, 1H), 7.77 (d, J = 6.32 Hz, 1H).

Example 1(45)

4-(4-acetylpiperazin-1-yl)-2-(2-dimethylaminoethylamino)pyrimidine

[0331] TLC : Rf 0.40 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1)

NMR (DMSO-d₆) : δ 2.02 (s, 3H), 2.54 (s, 6H), 2.87 (t, J = 6.32 Hz, 2H), 3.40 (m, 10H), 6.09 (d, J = 6.04 Hz, 1H), 6.64 (m, 1H), 7.83 (d, J = 6.04 Hz, 1H).

Example 1(46)

2-(2-dimethylaminoethylamino)-4-(3-methylpiperidin-1-yl)pyrimidine

[0332] TLC : Rf 0.50 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO-d₆) : δ 0.86 (d, J = 6.60 Hz, 3H), 1.14 (m, 1H), 1.34 (m, 1H), 1.48 (m, 1H), 1.62 (m, 1H), 1.78 (m, 1H), 2.14 (s, 6H), 2.34 (t, J = 6.90 Hz, 2H), 2.44 (m, 1H), 2.76 (m, 1H), 3.27 (m, 2H), 4.16 (m, 2H), 5.98 (d, J = 5.80 Hz, 1H), 6.20 (m, 1H), 7.73 (d, J = 5.80 Hz, 1H).

Example 1(47)

2-(2-aminoethylamino)-5-bromo-4-(perhydroazepin-1-yl)pyrimidine dihydrochloride

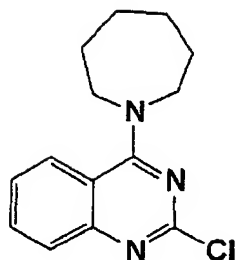
[0333] TLC : Rf 0.60 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (CD₃OD) : δ 1.65 (m, 4H), 1.90 (m, 4H), 3.21 (t, J = 6.00 Hz, 2H), 3.73 (t, J = 6.00 Hz, 2H), 4.11 (m, 4H), 8.06 (s, 1H).

Reference Example 2

2-chloro-4-(perhydroazepin-1-yl)quinazoline

[0334]



[0335] To a solution of 2,4-dichloroquinazoline (1.0 g) in tetrahydrofuran (10 mL) were added triethylamine (2.1 mL) and perhydroazepine (0.745 mL) with ice cooling and the mixture was stirred for 1 hour at room temperature. To the reaction mixture was added water (20 mL) and the resulting mixture was concentrated. The residue was extracted with methylene chloride three times. The organic layer was washed with brine, dried over anhydrous magnesium sulfate and concentrated. The residue was washed with hexane-diethyl ether (10 : 1) to give the title compound (991 mg) having the following physical data.

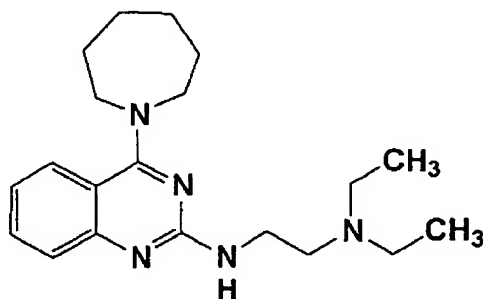
TLC : R_f 0.31 (hexane : ethyl acetate = 3 : 1); MS (m/z) : 264, 262 (M + H)⁺;

HPLC retention time (min) 3.34; HPLC condition : A.

Example 2

2-(2-diethylaminoethylamino)-4-(perhydroazepin-1-yl)quinazoline

[0336]



[0337] To a solution of the compound prepared in Reference Example 2 (300 mg) in 2-propanol (3 mL) was added N,N-diethylethylenediamine (0.49 mL) and the mixture was stirred for 16 hours at 80°C. The reaction mixture was cooled and the residue was purified by column chromatography on silica gel (ethyl acetate : methanol : triethylamine = 10 : 1 : 0 → 10 : 1 : 0.3) to give the compound (267 mg) of the present invention having the following physical data.

TLC : R_f 0.43 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (CDCl₃) : δ 7.80 (d, J = 7.5 Hz, 1H), 7.45 (m, 2H), 6.98 (m, 1H), 5.26 (br, 1H), 3.87 (m, 4H), 3.53 (m, 2H), 2.66 (t, J = 6.3 Hz, 2H), 2.58 (q, J = 6.9 Hz, 4H), 1.97 (m, 4H), 1.66 (m, 4H), 1.04 (t, J = 6.9 Hz, 6H); MS (m/z) : 342 (M + H)⁺, 171;

HPLC retention time (min) : 2.96 min.; HPLC condition : A.

Example 2(1) to Example 2(95)

[0338] By the same procedure as described in Reference Example 2 → Example 2 using corresponding compounds, the compounds of the present invention having the following physical data were given.

Example 2(1)

2-[2-[N,N-bis(2-hydroxyethyl)amino]ethylamino]-4-pyrrolidinoquinazoline

5 [0339] HPLC retention time (min) : 2.78; MS (m/z) : 346 (M + H)⁺, 242; HPLC condition : A.

Example 2(2)

2-[3-(imidazol-1-yl)propylamino]-4-pyrrolidinoquinazoline

10 [0340] HPLC retention time (min) : 2.96; MS (m/z) : 323 (M + H)⁺, 215; HPLC condition : A.

Example 2(3)

2-(2-morpholinoethylamino)-4-pyrrolidinoquinazoline

15 [0341] HPLC retention time (min) : 2.77; MS (m/z) : 328 (M + H)⁺, 242; HPLC condition : A.

Example 2(4)

2-[3-(2-methylpiperidin-1-yl)propylamino]-4-pyrrolidinoquinazoline

20 [0342] HPLC retention time (min) : 2.98; MS (m/z) : 354 (M + H)⁺; HPLC condition : A.

Example 2(5)

2-[2-[N,N-bis(2-hydroxyethyl)amino]ethylamino]-4-piperidinoquinazoline

25 [0343] HPLC retention time (min) : 2.87; MS (m/z) : 719(2M + H)⁺, 360 (M + H)⁺; HPLC condition : A.

Example 2(6)

2-[3-(imidazol-1-yl)propylamino]-4-piperidinoquinazoline

30 [0344] HPLC retention time (min) : 3.01; MS (m/z) : 337 (M + H)⁺, 229; HPLC condition : A.

Example 2(7)

2-(2-morpholinoethylamino)-4-piperidinoquinazoline

40 [0345] HPLC retention time (min) : 2.90; MS (m/z) : 342 (M + H)⁺; HPLC condition : A.

Example 2(8)

2-(3-pyrrolidinopropylamino)-4-piperidinoquinazoline

45 [0346] HPLC retention time (min) : 2.98; MS (m/z) : 340 (M + H)⁺, 229; HPLC condition : A.

Example 2(9)

2-[2-(1-methylpyrrolidin-2-yl)ethylamino]-4-piperidinoquinazoline

50 [0347] HPLC retention time (min) : 2.98; MS (m/z) : 340 (M + H)⁺, 170.5; HPLC condition : A.

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EP 1 571 146 A1

Example 2(10)

2-(1-ethylpyrrolidin-2-ylmethylamino)-4-piperidinoquinazoline

5 [0348] HPLC retention time (min) : 2.96; MS (m/z) : 340 (M + H)⁺; HPLC condition : A.

Example 2(11)

2-(2,2-dimethyl-3-dimethylaminopropylamino)-4-piperidinoquinazoline

10 [0349] HPLC retention time (min) : 3.00; MS (m/z) : 342 (M + H)⁺; HPLC condition : A.

Example 2(12)

15 2-(2-dimethylaminopropylamino)-4-piperidinoquinazoline

[0350] HPLC retention time (min) : 2.94; MS (m/z) : 314 (M + H)⁺; HPLC condition : A.

Example 2(13)

20 2-(2-diethylaminoethylamino)-4-piperidinoquinazoline

[0351] HPLC retention time (min) : 2.94; MS (m/z) : 328 (M + H)⁺; HPLC condition : A.

25 Example 2(14)

2-(3-diethylaminopropylamino)-4-piperidinoquinazoline

[0352] HPLC retention time (min) : 2.98; MS (m/z) : 342 (M + H)⁺, 314, 229; HPLC condition : A.

Example 2(15)

2-(3-morpholinopropylamino)-4-piperidinoquinazoline

35 [0353] HPLC retention time (min) : 2.96; MS (m/z) : 356 (M + H)⁺, 178.5; HPLC condition : A.

Example 2(16)

2-[3-[N,N-bis(2-hydroxyethyl)amino]propylamino]-4-piperidinoquinazoline

40 [0354] HPLC retention time (min) : 2.92; MS (m/z) : 374 (M + H)⁺, 356, 314; HPLC condition : A.

Example 2(17)

45 2-(3-dimethylaminopropylamino)-4-piperidinoquinazoline

[0355] HPLC retention time (min) : 2.96; MS (m/z) : 314 (M + H)⁺; HPLC condition : A.

Example 2(18)

50 2-(2-dimethylamino-1-methylethylamino)-4-piperidinoquinazoline

[0356] HPLC retention time (min) : 2.92; MS (m/z) : 314 (M + H)⁺; HPLC condition : A.

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Example 2(19)

2-[3-(2-methylpiperidin-1-yl)propylamino]-4-piperidinoquinazoline

5 [0357] HPLC retention time (min) : 3.03; MS (m/z) : 368 (M + H)⁺, 229; HPLC condition : A.

Example 2(20)

2-[2-[N,N-bis(2-hydroxyethyl)amino]ethylamino]-4-(perhydroazepin-1-yl)quinazoline

10

[0358] HPLC retention time (min) : 2.90; MS (m/z) : 747 (2M + H)⁺, 374 (M + H)⁺; HPLC condition : A.

Example 2(21)

15 2-[3-(imidazol-1-yl)propylamino]-4-(perhydroazepin-1-yl)quinazoline

[0359] HPLC retention time (min) : 3.09; MS (m/z) : 351 (M + H)⁺; HPLC condition : A.

Example 2(22)

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2-(2-morpholinoethylamino)-4-(perhydroazepin-1-yl)quinazoline

[0360] HPLC retention time (min) : 2.96; MS (m/z) : 711 (2M + H)⁺, 356 (M + H)⁺; HPLC condition : A.

25 Example 2(23)

2-(3-pyrrolidinopropylamino)-4-(perhydroazepin-1-yl)quinazoline

[0361] HPLC retention time (min) : 3.05; MS (m/z) : 354 (M + H)⁺; HPLC condition : A.

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Example 2(24)

2-[2-(1-methylpyrrolidin-2-yl)ethylamino]-4-(perhydroazepin-1-yl)quinazoline

35 [0362] HPLC retention time (min) : 3.03; MS (m/z) : 707 (2M + H)⁺, 354 (M + H)⁺; HPLC condition : A.

Example 2(25)

2-(1-ethylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)quinazoline

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[0363] HPLC retention time (min) : 3.03; MS (m/z) : 354 (M + H)⁺; HPLC condition : A.

Example 2(26)

45 2-(2,2-dimethyl-3-dimethylaminopropylamino)-4-(perhydroazepin-1-yl)quinazoline

[0364] HPLC retention time (min) : 3.05; MS (m/z) : 711 (2M + H)⁺, 356 (M + H)⁺; HPLC condition : A.

Example 2(27)

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2-(2-dimethylaminopropylamino)-4-(perhydroazepin-1-yl)quinazoline

[0365] HPLC retention time (min) : 3.01; MS (m/z) : 328 (M + H)⁺; HPLC condition : A.

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Example 2(28)

2-(3-diethylaminopropylamino)-4-(perhydroazepin-1-yl)quinazoline

5 [0366] HPLC retention time (min) : 3.05; MS (m/z) : 356 (M + H)⁺; HPLC condition : A.

Example 2(29)

2-(3-morpholinopropylamino)-4-(perhydroazepin-1-yl)quinazoline

10 [0367] HPLC retention time (min) : 3.00; MS (m/z) : 370 (M + H)⁺; HPLC condition : A.

Example 2(30)

15 2-[3-[N,N-bis(2-hydroxyethyl)amino]propylamino]-4-(perhydroazepin-1-yl)quinazoline

[0368] HPLC retention time (min) : 2.96; MS (m/z) : 388 (M + H)⁺; HPLC condition : A.

Example 2(31)

20 2-(2-dimethylamino-1-methylethylamino)-4-(perhydroazepin-1-yl)quinazoline

[0369] HPLC retention time (min) : 2.98; MS (m/z) : 328 (M + H)⁺; HPLC condition : A.

25 Example 2(32)

2-[3-(2-methylpiperidin-1-yl)propylamino]-4-(perhydroazepin-1-yl)quinazoline

30 [0370] HPLC retention time (min) : 3.11; MS (m/z) : 382 (M + H)⁺, 243; HPLC condition : A.

Example 2(33)

2-(2-dimethylaminoethylamino)-4-pyrrolidinoquinazoline

35 [0371] HPLC retention time (min) : 2.83; MS (m/z) : 286 (M + H)⁺, 241; HPLC condition : A.

Example 2(34)

2-(2-pyrrolidinoethylamino)-4-pyrrolidinoquinazoline

40 [0372] HPLC retention time (min) : 3.11; MS (m/z) : 312 (M + H)⁺, 241; HPLC condition : A.

Example 2(35)

45 2-(3-pyrrolidinopropylamino)-4-pyrrolidinoquinazoline

[0373] HPLC retention time (min) : 2.89; MS (m/z) : 326 (M + H)⁺, 215; HPLC condition : A.

Example 2(36)

50 2-(2-piperidinoethylamino)-4-pyrrolidinoquinazoline

[0374] HPLC retention time (min) : 2.90; MS (m/z) : 326 (M + H)⁺; HPLC condition : A.

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Example 2(37)

2-(2-(1-methylpyrrolidin-2-yl)ethylamino)-4-pyrrolidinoquinazoline

5 [0375] HPLC retention time (min) : 2.90; MS (m/z) : 651 (2M + H)⁺, 326 (M + H)⁺; HPLC condition : A.

Example 2(38)

2-(1-ethylpyrrolidin-2-ylmethylamino)-4-pyrrolidinoquinazoline

10 [0376] HPLC retention time (min) : 2.89; MS (m/z) : 326 (M + H)⁺; HPLC condition : A.

Example 2(39)

15 2-(2,2-dimethyl-3-dimethylaminopropylamino)-4-pyrrolidinoquinazoline

[0377] HPLC retention time (min) : 2.94; MS (m/z) : 328 (M + H)⁺; HPLC condition : A.

Example 2(40)

20 2-(2-dimethylaminopropylamino)-4-pyrrolidinoquinazoline

[0378] HPLC retention time (min) : 2.89; MS (m/z) : 300 (M + H)⁺, 150.5; HPLC condition : A.

25 Example 2(41)

2-(2-diethylaminoethylamino)-4-pyrrolidinoquinazoline

30 [0379] HPLC retention time (min) : 2.89; MS (m/z) : 314 (M + H)⁺, 241; HPLC condition : A.

Example 2(42)

2-(3-diethylaminopropylamino)-4-pyrrolidinoquinazoline

35 [0380] HPLC retention time (min) : 2.92; MS (m/z) : 328 (M + H)⁺; HPLC condition : A.

Example 2(43)

2-(3-morpholinopropylamino)-4-pyrrolidinoquinazoline

40 [0381] HPLC retention time (min) : 2.89; MS (m/z) : 342 (M + H)⁺; HPLC condition : A.

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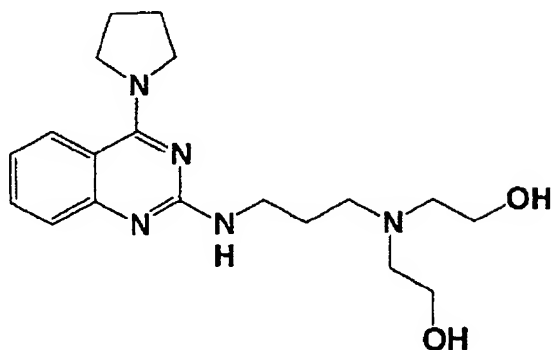
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Example 2(44)

2-[3-[N,N-bis(2-hydroxyethyl)amino]propylamino]-4-pyrrolidinoquinazoline

[0382]



HPLC retention time (min) : 2.89; MS (m/z) : 360 (M + H)⁺; HPLC condition : A.

Example 2(45)

2-(3-dimethylaminopropylamino)-4-pyrrolidinoquinazoline

[0383] HPLC retention time (min) : 2.89; MS (m/z) : 300 (M + H)⁺, 255; HPLC condition : A.

Example 2(46)

2-(2-dimethylamino-1-methylethylamino)-4-pyrrolidinoquinazoline

[0384] HPLC retention time (min) : 2.87; MS (m/z) : 300 (M + H)⁺; HPLC condition : A.

Example 2(47)

2-(1-methylpyrrolidin-2-ylmethylamino)-4-pyrrolidinoquinazoline

[0385] HPLC retention time (min) : 2.91; MS (m/z) : 312 (M + H)⁺; HPLC condition : A.

Example 2(48)

2-[2-[N,N-bis(2-hydroxyethyl)amino]ethylamino]-4-(perhydroazocin-1-yl)quinazoline

[0386] HPLC retention time (min) : 3.00; MS (m/z) : 775 (2M + H)⁺, 388 (M + H)⁺; HPLC condition : A.

Example 2(49)

2-(2-pyrrolidinoethylamino)-4-(perhydroazocin-1-yl)quinazoline

[0387] HPLC retention time (min) : 3.02; MS (m/z) : 354 (M + H)⁺; HPLC condition : A.

Example 2(50)

2-(3-imidazol-1-ylpropylamino)-4-(perhydroazocin-1-yl)quinazoline

[0388] HPLC retention time (min) : 3.07; MS (m/z) : 729 (2M + H)⁺, 365 (M + H)⁺; HPLC condition : A.

Example 2(51)

2-(2-morpholinoethylamino)-4-(perhydroazocin-1-yl)quinazoline

5 [0389] HPLC retention time (min) : 3.01; MS (m/z) : 739 (2M + H)⁺, 370 (M + H)⁺; HPLC condition : A.

Example 2(52)

2-(3-pyrrolidinopropylamino)-4-(perhydroazocin-1-yl)quinazoline

10 [0390] HPLC retention time (min) : 3.11; MS (m/z) : 368 (M + H)⁺, 184.5; HPLC condition : A.

Example 2(53)

15 2-(2-piperidinoethylamino)-4-(perhydroazocin-1-yl)quinazoline

[0391] HPLC retention time (min) : 3.07; MS (m/z) : 368 (M + H)⁺, 184.5; HPLC condition : A.

Example 2(54)

20 2-[2-(1-methylpyrrolidin-2-yl)ethylamino]-4-(perhydroazocin-1-yl)quinazoline

[0392] HPLC retention time (min) : 3.09; MS (m/z) : 735 (2M + H)⁺, 368 (M + H)⁺; HPLC condition : A.

25 Example 2(55)

2-(1-ethylpyrrolidin-2-ylmethylamino)-4-(perhydroazocin-1-yl)quinazoline

30 [0393] HPLC retention time (min) : 3.09; MS (m/z) : 368 (M + H)⁺, 207; HPLC condition : A.

Example 2(56)

2-(3-dimethylamino-2,2-dimethylpropylamino)-4-(perhydroazocin-1-yl)quinazoline

35 [0394] HPLC retention time (min) : 3.11; MS (m/z) : 370 (M + H)⁺; HPLC condition : A.

Example 2(57)

2-(2-dimethylaminopropylamino)-4-(perhydroazocin-1-yl)quinazoline

40 [0395] HPLC retention time (min) : 3.07; MS (m/z) : 342 (M + H)⁺; HPLC condition : A.

Example 2(58)

45 2-(2-diethylaminoethylamino)-4-(perhydroazocin-1-yl)quinazoline

[0396] HPLC retention time (min) : 3.05; MS (m/z) : 356 (M + H)⁺; HPLC condition : A.

Example 2(59)

50 2-(3-diethylaminopropylamino)-4-(perhydroazocin-1-yl)quinazoline

[0397] HPLC retention time (min) : 3.11; MS (m/z) : 370 (M + H)⁺, 185.5; HPLC condition : A.

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Example 2(60)

2-(3-morpholinopropylamino)-4-(perhydroazocin-1-yl)quinazoline

5 [0398] HPLC retention time (min) : 3.07; MS (m/z) : 384 (M + H)⁺; HPLC condition : A.

Example 2(61)

2-[3-[N,N-bis(2-hydroxyethyl)amino]propylamino]-4-(perhydroazocin-1-yl)quinazoline

10 [0399] HPLC retention time (min) : 3.03; MS (m/z) : 402 (M + H)⁺; HPLC condition : A.

Example 2(62)

15 2-(3-dimethylaminopropylamino)-4-(perhydroazocin-1-yl)quinazoline

[0400] HPLC retention time (min) : 3.07; MS (m/z) : 342 (M + H)⁺, 297; HPLC condition : A.

Example 2(63)

20 2-(2-dimethylamino-1-methylethylamino)-4-(perhydroazocin-1-yl)quinazoline

[0401] HPLC retention time (min) : 3.02; MS (m/z) : 342 (M + H)⁺; HPLC condition : A.

25 Example 2(64)

2-[3-(2-methylpiperidin-1-yl)propylamino]-4-(perhydroazocin-1-yl)quinazoline

30 [0402] HPLC retention time (min) : 3.14; MS (m/z) : 396 (M + H)⁺, 198.5; HPLC condition : A.

Example 2(65)

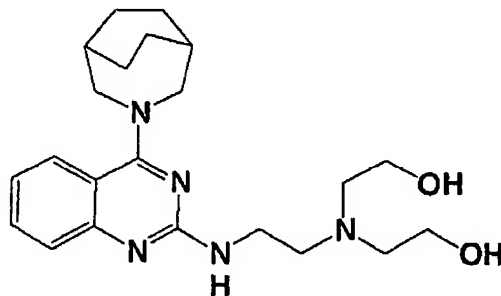
2-(1-methylpyrrolidin-2-ylmethylamino)-4-(perhydroazocin-1-yl)quinazoline

35 [0403] HPLC retention time (min) : 3.07; MS (m/z) : 354 (M + H)⁺; HPLC condition : A.

Example 2(66)

2-[2-[N,N-bis(2-hydroxyethyl)amino]ethylamino]-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

40 [0404]



55 HPLC retention time (min) : 3.01; MS (m/z) : 799 (2M + H)⁺, 400 (M + H)⁺; HPLC condition : A.

Example 2(67)

2-(2-pyrrolidinoethylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

5 [0405] HPLC retention time (min) : 3.09; MS (m/z) : 366 (M + H)⁺, 207; HPLC condition : A.

Example 2(68)

2-[3-(imidazol-1-ylamino)propyl]-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

10 [0406] HPLC retention time (min) : 3.11; MS (m/z) : 753 (2M + H)⁺, 377 (M + H)⁺; HPLC condition : A.

Example 2(69)

15 2-(2-morpholinoethylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

[0407] HPLC retention time (min) : 3.45; MS (m/z) : 763(2M + H)⁺, 382 (M + H)⁺; HPLC condition : A..

Example 2(70)

20 2-(3-pyrrolidinopropylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

[0408] HPLC retention time (min): 3.11; MS (m/z): 380 (M + H)⁺, 190.5; HPLC condition : A.

25 Example 2(71)

2-(2-piperidinoethylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

30 [0409] HPLC retention time (min) : 3.11; MS (m/z) : 380 (M + H)⁺; HPLC condition : A.

Example 2(72)

2-[2-(1-methylpyrrolidin-2-yl)ethylamino]-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

35 [0410] HPLC retention time (min) : 3.11; MS (m/z) : 380 (M + H)⁺; HPLC condition : A.

Example 2(73)

2-(1-ethylpyrrolidin-2-ylmethylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

40 [0411] HPLC retention time (min) : 3.11; MS (m/z) : 380 (M + H)⁺; HPLC condition : A.

Example 2(74)

45 2-[3-dimethylamino-2,2-dimethylpropylamino]-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

[0412] HPLC retention time (min) : 3.14; MS (m/z) : 382 (M + H)⁺; HPLC condition : A.

Example 2(75)

50 2-(2-dimethylaminopropylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

[0413] HPLC retention time (min) : 3.09; MS (m/z) : 354 (M + H)⁺; HPLC condition : A.

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Example 2(76)

2-(2-diethylaminoethylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

5 [0414] HPLC retention time (min) : 3.06; MS (m/z) : 368 (M + H)⁺; HPLC condition : A.

Example 2(77)

2-(3-diethylaminopropylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

10 [0415] HPLC retention time (min) : 3.14; MS (m/z) : 382 (M + H)⁺, 191.5; HPLC condition : A.

Example 2(78)

15 2-(3-morpholinopropylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

[0416] HPLC retention time (min) : 3.08; MS (m/z) : 791 (2M + H)⁺, 396 (M + H)⁺; HPLC condition : A.

Example 2(79)

20 2-[3-[N,N-bis(2-hydroxyethyl)amino]propylamino]-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

[0417] HPLC retention time (min) : 3.05; MS (m/z) : 414 (M + H)⁺; HPLC condition : A.

25 Example 2(80)

2-(3-dimethylaminopropylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

30 [0418] HPLC retention time (min) : 3.09; MS (m/z) : 354 (M + H)⁺; HPLC condition : A.

Example 2(81)

2-(2-dimethylamino-1-methylethylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

35 [0419] HPLC retention time (min) : 3.07; MS (m/z) : 354 (M + H)⁺; HPLC condition : A.

Example 2(82)

2-[3-(2-methylpiperidin-1-yl)propylamino]-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

40 [0420] HPLC retention time (min) : 3.18; MS (m/z) : 408 (M + H)⁺; HPLC condition : A.

Example 2(83)

45 2-(1-methylpyrrolidin-2-ylmethylamino)-4-(3-azabicyclo[3.2.2]nonan-3-yl)quinazoline

[0421] HPLC retention time (min) : 3.09; MS (m/z) : 731 (2M + H)⁺, 366 (M + H)⁺; HPLC condition : A.

Example 2(84)

50 2-(2-dimethylaminoethylamino)-4-piperidinoquinazoline

[0422] MS (m/z) : 300 (M + H)⁺;
HPLC retention time (min) : 3.83; HPLC condition : B.

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Example 2(85)

2-(2-pyrrolidinoethylamino)-4-piperidinoquinazoline

5 **[0423]** NMR (DMSO- d_6) : δ 7.66 (d, J = 7.2 Hz, 1H), 7.48 (m, 1H), 7.30 (d, J = 8.4 Hz, 1H), 7.04 (t, J = 7.2 Hz, 1H), 6.51 (m, 1H), 3.50 (m, 4H), 3.43 (m, 2H), 3.25 (m, 2H), 3.15 (m, 2H), 2.57 (t, J = 6.9 Hz, 2H), 1.66 (m, 10H);
MS (m/z) : 326 (M + H)⁺, 283;
HPLC retention time (min) : 4.16; HPLC condition : B.

10 Example 2(86)

2-(2-piperidinoethylamino)-4-piperidinoquinazoline

15 **[0424]** NMR (DMSO- d_6) : δ 7.66 (dd, J = 8.4, 0.9 Hz, 1H), 7.49 (m, 1H), 7.30 (d, J = 8.1 Hz, 1H), 7.04 (t, J = 7.2 Hz, 1H), 6.45 (m, 1H), 3.40 (m, 4H), 3.43 (m, 2H), 2.45 (t, J = 7.2 Hz, 2H), 2.37 (m, 4H), 1.66 (m, 6H), 1.49 (m, 4H), 1.38 (m, 2H);
MS (m/z) : 340 (M + H)⁺;
HPLC retention time (min) : 4.16; HPLC condition : B.

20 Example 2(87)

2-(2-pyrrolidinoethylamino)-4-(perhydroazepin-1-yl)quinazoline

25 **[0425]** NMR (DMSO- d_6) : δ 7.81 (d, J = 8.4 Hz, 1H), 7.44 (m, 1H), 7.25 (d, J = 7.8 Hz, 1H), 6.96 (t, J = 7.5 Hz, 1H), 6.29 (m, 1H), 3.81 (m, 4H), 3.39 (m, 2H), 2.56 (t, J = 6.9 Hz, 2H), 2.37 (m, 4H), 1.86 (m, 4H), 1.67 (m, 4H), 1.56 (m, 4H);
MS (m/z) : 340 (M + H)⁺, 215;
HPLC retention time (min) : 4.41; HPLC condition : B.

Example 2(88)

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2-(2-piperidinoethylamino)-4-(perhydroazepin-1-yl)quinazoline

35 **[0426]** NMR (DMSO- d_6) : δ 7.81 (d, J = 8.4 Hz, 1H), 7.44 (m, 1H), 7.25 (d, J = 8.4 Hz, 1H), 6.92 (t, J = 8.4 Hz, 1H), 6.23 (m, 1H), 3.85 (m, 4H), 3.38 (m, 2H), 2.43 (m, 2H), 2.36 (m, 4H), 1.86 (m, 4H), 1.56 (m, 4H), 1.48 (m, 4H), 1.37 (m, 2H);
MS (m/z) : 354 (M + H)⁺;
HPLC retention time (min) : 3.96; HPLC condition : B.

Example 2(89)

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2-(3-dimethylaminopropylamino)-4-(perhydroazepin-1-yl)quinazoline

45 **[0427]** NMR (DMSO- d_6) : δ 7.80 (d, J = 7.5 Hz, 1H), 7.48 (m, 1H), 7.24 (d, J = 7.8 Hz, 1H), 6.95 (t, J = 7.5 Hz, 1H), 6.49 (m, 1H), 3.80 (m, 4H), 3.30 (m, 2H), 2.24 (t, J = 6.9 Hz, 2H), 2.11 (s, 6H), 1.86 (m, 4H), 1.62 (m, 2H), 1.56 (m, 4H);
MS (m/z) : 328 (M + H)⁺;
HPLC retention time (min) : 2.96; HPLC condition : A.

Example 2(90)

50 2-(4-dimethylaminobutylamino)-4-(perhydroazepin-1-yl)quinazoline

55 **[0428]** NMR (DMSO- d_6) : δ 7.81 (d, J = 8.1 Hz, 1H), 7.44 (t, J = 8.1 Hz, 1H), 7.24 (d, J = 8.1 Hz, 1H), 6.96 (t, J = 8.1 Hz, 1H), 6.57 (m, 1H), 3.81 (m, 4H), 3.30 (m, 2H), 2.37 (m, 2H), 2.21 (s, 6H), 1.86 (m, 4H), 1.56 (m, 4H), 1.50 (m, 4H);
MS (m/z) : 342 (M + H)⁺;
HPLC retention time (min) : 3.00; HPLC condition : A.

Example 2(91)

4-(2-dimethylaminoethylamino)-2-(perhydroazepin-1-yl)quinazoline

- 5 **[0429]** TLC : Rf 0.31 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 7.89 (d, J = 6.9 Hz, 1H), 7.83 (t, J = 6.3 Hz, 1H), 7.43 (dd, J = 8.4, 6.9 Hz, 1H), 7.21 (d, J = 7.8 Hz, 1H), 6.98 (dd, J = 8.4, 7.8 Hz, 1H), 3.74 (t, J = 6.0 Hz, 4H), 3.57 (dt, J = 6.3, 6.3 Hz, 2H), 2.54 (t, J = 6.3 Hz, 2H), 2.22 (s, 6H), 1.71 (m, 4H), 1.46 (m, 4H).

10 Example 2(92)

2-(2-aminoethylamino)-4-(perhydroazepin-1-yl)quinazoline

- 15 **[0430]** TLC : Rf 0.14 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 7.81 (d, J = 8.4 Hz, 1H), 7.43 (dd, J = 8.4, 7.2 Hz, 1H), 7.25 (d, J = 8.4 Hz, 1H), 6.96 (dd, J = 8.4, 7.2 Hz, 1H), 6.46 (br, 1H), 3.79 (m, 4H), 3.29 (m, 2H), 2.69 (t, J = 6.0 Hz, 2H), 1.85 (m, 4H), 1.56 (m, 4H).

Example 2(93)

20 2-(2-dimethylaminoethylamino)-4-(perhydroazocin-1-yl)quinazoline

- [0431]** TLC : Rf 0.31 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.61 (m, 6H), 1.90 (m, 4H), 2.60 (s, 6H), 2.98 (t, J = 6.18 Hz, 2H), 3.65 (t, J = 6.18 Hz, 2H), 3.94 (m, 4H), 7.17 (m, 1H), 7.42 (m, 1H), 7.57 (m, 1H), 7.96 (d, J = 8.24 Hz, 1H).

25 Example 2(94)

4-(3-azabicyclo[3.2.2]nonan-3-yl)-2-(2-dimethylaminoethylamino)quinazoline

- 30 **[0432]** TLC : Rf 0.34 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 2.01 (m, 10H), 2.56 (s, 6H), 2.77 (t, J = 6.73 Hz, 2H), 3.74 (m, 2H), 4.17 (m, 4H), 6.71 (m, 1H), 7.37 (t, J = 8.1 Hz, 1H), 7.65 (d, J = 8.1 Hz, 1H), 7.83 (t, J = 8.1 Hz, 1H), 8.09 (d, J = 8.10 Hz, 1H).

Example 2(95)

35 2-(2-dimethylaminoethylamino)-4-(perhydroazepin-1-yl)quinazoline

- [0433]** TLC : Rf 0.45 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 1.56 (m, 4H), 1.85 (m, 4H), 2.16 (s, 6H), 2.39 (t, J = 6.87 Hz, 2H), 3.37 (m, 2H), 3.80 (m, 4H), 6.23 (m, 1H), 6.96 (m, 1H), 7.25 (d, J = 8.24 Hz, 1H), 7.44 (m, 1H), 7.81 (d, J = 8.52 Hz, 1H).

Reference Example 3

45 2-[1-(t-butoxycarbonyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

- [0434]** The title compound having the following physical data was given by substituting N,N-dimethylethylenediamine in example 1 with 1-(t-butoxycarbonyl)pyrrolidin-2-ylmethylamine.

- TLC : Rf 0.45 (chloroform : methanol = 9 : 1);
 NMR (CDCl₃) : δ 7.65 (m, 1H), 5.81 (d, J = 6.3 Hz, 1H), 4.01 (m, 1H), 3.52 (m, 8H), 1.89 (m, 4H), 1.75 (m, 4H), 1.55 (m, 4H), 1.46 (s, 9H);
 MS (m/z) : 376 (M + H)⁺.

Example 3

- 55 **[0435]** To the compound prepared in Reference Example 3 (1.06 g) was added a 95% aqueous solution of trifluoroacetic acid (20 mL) with ice cooling and the mixture was stirred for 2 hours at 0°C. The reaction mixture was concentrated and the residue was purified by column chromatography on silica gel (chloroform : methanol = 9 : 1 → chloroform : methanol : 28% ammonia water = 80 : 10 : 1) to give the compound of the present invention (0.72 g) having the following

physical data.

TLC : Rf 0.08 (chloroform : methanol: 28% ammonia water = 80 : 10: 1);

NMR (CDCl₃) : δ 1.48 (m, 6H), 1.73 (m, 4H), 2.07 (m, 2H), 2.76 (m, 2H), 3.02 (m, 2H), 3.14 (m, 2H), 3.55 (m, 3H), 3.89 (m, 1H), 4.84 (d, J = 6.30 Hz, 1H), 5.78 (d, J = 6.30 Hz, 1H), 7.79 (d, J = 6.30 Hz, 1H);

5 MS (FAB, Pos., Glycerin + m-NBA) (m/z) : 276 (M + H)⁺.

Example 4

10 **[0436]** A mixture of the compound prepared in Reference Example 1 (4.00 g) and 1-benzyl-3-aminopyrrolidine (4.33 g) was stirred for 16 hours at 90°C. The resulting solution was cooled and purified by column chromatography on silica gel (ethyl acetate : hexane = 1 : 2 → chloroform : methanol : 28% ammonia water = 80 : 10 : 0.6) to give the title compound (4.85 g) having the following physical data.

TLC : Rf 0.45 (chloroform : methanol: 28% ammonia water = 80 : 10 : 1);

15 NMR (DMSO-d₆) : δ 1.50 (m, 4H), 1.74 (m, 5H), 2.21 (m, 1H), 2.60 (dd, J = 9.89, 5.22 Hz, 1H), 2.70 (m, 1H), 2.83 (m, 1H), 3.00 (dd, J = 9.89, 6.87 Hz, 1H), 3.55 (m, 4H), 3.78 (s, 2H), 4.33 (m, 1H), 5.93 (d, J = 6.32 Hz, 1H), 6.35 (m, 1H), 7.31 (m, 5H), 7.73 (d, J = 6.04 Hz, 1H).

Example 5

20 **[0437]** Under atmosphere of argon to a solution of the compound prepared in Example 4 (4.5 g) in ethanol (150 mL) was added palladium hydroxide (0.97 g), and under atmosphere of hydrogen the mixture was stirred for 4 hours at 75°C. The reaction mixture was cooled and filtered, and the filtrate was concentrated. The residue was purified by column chromatography on silica gel (methylene chloride : methanol : 28% ammonia water = 80 : 10 : 0.5 → 80 : 10 : 1) to give the compound of the present invention (2.96 g) having the following physical data.

25 TLC : Rf 0.15 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO-d₆) : δ 1.45 (m, 4H), 1.62 (m, 6H), 1.93 (m, 1H), 2.66 (dd, J = 11.26, 4.40 Hz, 1H), 2.76 (m, 1H), 2.94 (m, 2H), 3.59 (m, 4H), 4.16 (m, 1H), 5.85 (d, J = 6.04 Hz, 1H), 6.42 (m, 1H), 7.72 (d, J = 6.04 Hz, 1H).

Reference Example 4

30

2-(1-benzyloxycarbonylpiperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

35 **[0438]** A mixture of the compound prepared in Reference Example 1 (5.74 g) and 1-benzyloxycarbonyl-3-aminopiperidine (6.35 g) was stirred for 16 hours at 90°C. The reaction mixture was cooled and purified by column chromatography on silica gel (ethyl acetate : hexane = 1 : 2 → chloroform : methanol : 28% ammonia water = 80 : 10 : 0.5) to give the title compound (3.40 g) having the following physical data.

TLC : Rf 0.68 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1)

40 NMR (CDCl₃) : δ 1.40 (m, 2H), 1.55 (m, 4H), 1.69 (m, 4H), 2.05 (m, 2H), 3.05 (m, 2H), 3.55 (m, 4H), 3.91 (m, 1H), 4.12 (m, 2H), 4.73 (m, 1H), 5.13 (s, 2H), 5.80 (d, J = 6.00 Hz, 1H), 7.34 (m, 5H), 7.80 (d, J = 6.00 Hz, 1H).

Example 6

2-(piperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

45 **[0439]** Under atmosphere of argon, to a solution of the compound prepared in Reference Example 4 (5.06 g) in methanol (150 mL) was added palladium-carbon (1.0 g) and under atmosphere of hydrogen the mixture was stirred for 4 hours at room temperature. The reaction mixture was filtered and the filtrate was concentrated. The residue was purified by column chromatography on silica gel (methylene chloride : methanol : 28% ammonia water = 80 : 10 : 0.5 → 80 : 10 : 1) to give the compound of the present invention (3.02 g) having the following physical data.

50 TLC : Rf 0.18 (chloroform : methanol: 28% ammonia water = 80 : 10 : 1);

NMR (CDCl₃) : δ 1.48 (m, 6H), 1.73 (m, 4H), 2.07 (m, 2H), 2.76 (m, 2H), 3.02 (m, 2H), 3.14 (m, 2H), 3.55 (m, 3H), 3.89 (m, 1H), 4.84 (d, J = 6.30 Hz, 1H), 5.78 (d, J = 6.30 Hz, 1H), 7.79 (d, J = 6.30 Hz, 1H).

Example 6(1)

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4-(perhydroazepin-1-yl)-2-(piperidin-4-ylamino)pyrimidine

[0440] By the same procedure as described in Example 6 using corresponding compounds, the compound of the

present invention having the following physical data was given.

TLC : Rf 0.15 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO- d_6) : δ 1.27 (m, 2H), 1.45 (m, 4H), 1.65 (m, 4H), 1.76 (m, 2H), 2.47 (m, 2H), 2.92 (m, 2H), 3.63 (m, 5H), 5.81 (d, J = 6.04 Hz, 1H), 6.19 (m, 1H), 7.70 (d, J = 6.04 Hz, 1H).

5

Example 7

2-[1-(3-methylbutyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 **[0441]** To a solution of the compound prepared in Example 3 (200 mg) in a 1% solution of acetic acid in N,N-dimethylformamide (3 mL) were added 3-methylbutanal (93.4 mg) and sodium triacetoxyborohydride (462 mg) and the mixture was stirred for 8 hours at room temperature. To the reaction mixture was added acetic acid (0.5 mL). The resulting solution was poured into PS-sulfonic acid resin (prewashed with methanol (5 mL x 3 times), Argonaut Inc. product ID: 800287, lot. No. 00819, 1.43 mmol/g, 2.06 g). The resin was washed with methanol (5 mL x 3 times). Subsequently,

15 the resin was eluted with 5% triethylamine-methanol solution (30 mL) and the eluted solution was concentrated. The resin was dissolved in methylene chloride (10 mL) and thereto was added isocyanate resin (Argonaut Inc., product ID: 800262, lot. No. 00814, 1.43 mmol/g, 1.00 g) and the resulting mixture was subjected to a reaction. The reaction mixture was filtered and the filtrate was concentrated to give the compound of the present invention (85 mg) having the following physical data.

20 TLC : Rf 0.43 (dichloromethane : methanol : 28% ammonia water = 80 : 10 : 1);
NMR (DMSO- d_6 , 373 K) : δ 0.79 (d, J = 6.60 Hz, 3H), 0.80 (m, J = 6.60 Hz, 3H), 1.34 (m, 2H), 1.43 (m, 4H), 1.63 (m, 7H), 1.82 (m, 2H), 2.45 (m, 2H), 2.89 (m, 2H), 3.16 (m, 2H), 3.42 (m, 1H), 3.50 (t, J = 5.70 Hz, 4H), 5.83 (d, J = 6.20 Hz, 1H), 6.02 (m, 1H), 7.66 (d, J = 6.20 Hz, 1H);
HPLC retention time (min) : 4.53; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

25

Example 7(1) to Example 7(375)

[0442] By the same procedure as described in Reference Example 1 → Reference Example 3 → Example 3 → Example 7, Reference Example 1 → Example 4 → Example 5 → Example 7 or Reference Example 1 → Reference Example 4 → Example 6 → Example 7 using corresponding compounds, the compounds of the present invention having the following compounds were given.

30

Example 7(1)

35 2-[1-(4-methylbenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0443] TLC : Rf 0.54 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (CD₃OD) : δ 1.53 (m, 4H), 1.69 (m, 6H), 2.30 (s, 3H), 2.43 (dd, J = 10.03, 5.08 Hz, 1H), 2.57 (m, 1H), 2.70 (m, 1H), 2.92 (dd, J = 9.89, 7.14 Hz, 1H), 3.61 (m, 4H), 4.37 (m, 1H), 4.86 (s, 2H), 5.90 (d, J = 6.32 Hz, 1H), 7.16 (m, 4H), 7.65 (d, J = 6.32 Hz, 1H).

40

Example 7(2)

2-[1-(3-methoxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

45

[0444] TLC : Rf 0.85 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO- d_6) : δ 1.43 (m, 4H), 1.68 (m, 6H), 2.10 (m, 1H), 2.28 (dd, J = 9.34, 5.49 Hz, 1H), 2.48 (m, 1H), 2.79 (t, J = 8.10 Hz, 1H), 3.33 (s, 3H), 3.51 (m, 4H), 3.71 (s, 2H), 4.21 (m, 1H), 5.81 (m, 1H), 6.44 (s, 1H), 6.81 (m, 3H), 7.19 (m, 1H), 7.69 (m, 1H).

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Example 7(3)

2-(1-cyclohexylmethylpyrrolidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

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[0445] TLC : Rf 0.77 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);

NMR (DMSO- d_6 , 373.1K) : δ 0.94 (m, 2H), 1.20 (m, 3H), 1.46 (m, 5H), 1.67 (m, 10H), 2.10 (m, 1H), 2.24 (m, 2H), 2.37 (dd, J = 9.34, 5.22 Hz, 1H), 2.48 (m, 1H), 2.59 (m, 1H), 2.80 (dd, J = 9.07, 6.87 Hz, 1H), 3.56 (t, J = 6.00 Hz, 4H), 4.26 (m, 1H), 5.77 (m, 1H), 5.84 (d, J = 6.04 Hz, 1H), 7.72 (d, J = 6.04 Hz, 1H).

Example 7(4)

2-[(3S)-1-isobutylpyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0446] TLC : Rf 0.70 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 0.84 (d, J = 6.59 Hz, 6H), 1.44 (m, 4H), 1.62 (m, 5H), 2.09 (m, 4H), 2.25 (dd, J = 9.34, 5.49 Hz, 1H), 2.45 (m, 2H), 2.77 (t, J = 9.00 Hz, 1H), 3.38 (m, 4H), 4.19 (m, 1H), 5.83 (d, J = 6.04 Hz, 1H), 6.37 (m, 1H), 7.71 (d, J = 6.04 Hz, 1H).

Example 7(5)

2-[(3R)-1-isobutylpyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0447] TLC : Rf 0.70 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6) : δ 0.84 (d, J = 6.59 Hz, 6H), 1.44 (m, 4H), 1.62 (m, 5H), 2.09 (m, 4H), 2.25 (dd, J = 9.34, 5.49 Hz, 1H), 2.45 (m, 2H), 2.77 (t, J = 9.00 Hz, 1H), 3.38 (m, 4H), 4.19 (m, 1H), 5.83 (d, J = 6.04 Hz, 1H), 6.37 (m, 1H), 7.71 (d, J = 6.04 Hz, 1H).

Example 7(6)

2-[1-(2,4,6-trimethoxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0448] HPLC retention time (min) : 4.13; MS (m/z) : 911 (2M + H)⁺, 456 (M + H)⁺; HPLC condition : B.

Example 7(7)

2-[1-(3-cyanobenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0449] HPLC retention time (min) : 3.94; MS (m/z) : 781 (2M + H)⁺, 391 (M + H)⁺; HPLC condition : B.

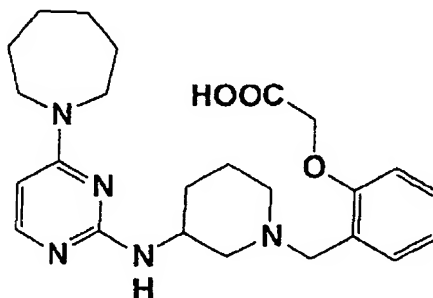
Example 7(8)

2-[1-(3-methylbutyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0450] HPLC retention time (min) : 4.34; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

Example 7(9)

2-[1-(2-carboxymethoxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0451]

HPLC retention time (min) : 3.04; MS (m/z) : 879 (2M + H)⁺, 440 (M + H)⁺; HPLC condition : B.

EP 1 571 146 A1

Example 7(10)

2-[1-(4-dimethylaminobenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0452] HPLC retention time (min) : 4.20; MS (m/z) : 817 (2M + H)⁺, 409 (M + H)⁺, 134; HPLC condition : B.

Example 7(11)

2-[1-(3-phenoxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10

[0453] HPLC retention time (min) : 4.50; MS (m/z) : 915 (2M + H)⁺, 458 (M + H)⁺; HPLC condition : B.

Example 7(12)

15 2-(1-carboxymethylpiperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0454] HPLC retention time (min) : 2.81; MS (m/z) : 667 (2M + H)⁺, 334 (M + H)⁺; HPLC condition : B.

Example 7(13)

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2-[1-(cyclopropylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0455] HPLC retention time (min) : 3.98; MS (m/z) : 659 (2M + H)⁺, 330 (M + H)⁺; HPLC condition : B.

25 Example 7(14)

2-[1-(3-methylthiopropyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0456] HPLC retention time (min) : 3.93; MS (m/z) : 364 (M + H)⁺; HPLC condition : B.

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Example 7(15)

2-[1-(quinolin-2-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 [0457] HPLC retention time (min) : 3.92; MS (m/z) : 833 (2M + H)⁺, 417 (M + H)⁺; HPLC condition : B.

Example 7(16)

2-[1-[(Z)-dec-4-enyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

40

[0458] HPLC retention time (min) : 3.53; MS (m/z) : 827 (2M + H)⁺, 414 (M + H)⁺, 207.5; HPLC condition : A.

Example 7(17)

45 2-[1-(3-phenylpropyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0459] HPLC retention time (min) : 4.34; MS (m/z) : 787 (2M + H)⁺, 394 (M + H)⁺; HPLC condition : B.

Example 7(18)

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2-(1-butylpiperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0460] HPLC retention time (min) : 4.23; MS (m/z) : 332 (M + H)⁺; HPLC condition : B.

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Example 7(19)

2-(1-benzylpiperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0461] HPLC retention time (min) : 4.13; MS (m/z) : 731 (2M + H)⁺, 366 (M + H)⁺; HPLC condition : B.

Example 7(20)

2-[1-[(E)-3-(4-dimethylaminophenyl)-2-propenyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0462] HPLC retention time (min) : 4.36; MS (m/z) : 869 (2M + H)⁺, 435 (M + H)⁺, 160; HPLC condition : B.

Example 7(21)

2-[1-[(E)-3-(2-furyl)-2-propenyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0463] HPLC retention time (min) : 4.03; MS (m/z) : 763 (2M + H)⁺, 382 (M + H)⁺; HPLC condition : B.

Example 7(22)

2-[1-(3-hydroxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0464] HPLC retention time (min) : 3.43; MS (m/z) : 763 (2M + H)⁺, 382 (M + H)⁺; HPLC condition : B.

Example 7(23)

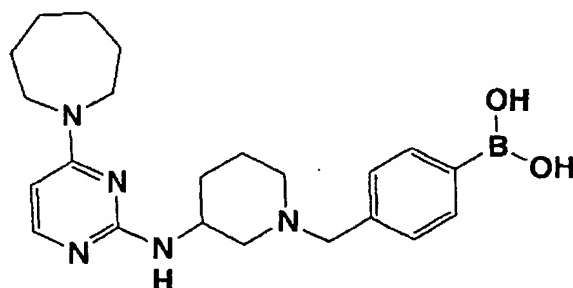
2-[1-(2-hydroxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0465] HPLC retention time (min) : 4.11; MS (m/z) : 763 (2M + H)⁺, 382 (M + H)⁺; HPLC condition : B.

Example 7(24)

2-[1-(4-dihydroxyborylbenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0466]



HPLC retention time (min) : 3.09; MS (m/z) : 410 (M + H)⁺; HPLC condition : B.

Example 7(25)

2-[1-(4-heptyloxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0467] HPLC retention time (min) : 3.70; MS (m/z) : 959 (2M + H)⁺, 480 (M + H)⁺; HPLC condition: A.

Example 7(26)

2-[1-(benzo[b]furan-2-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0468] HPLC retention time (min) : 4.14; MS (m/z) : 811 (2M + H)⁺, 406 (M + H)⁺; HPLC condition : B.

Example 7(27)

2-[1-(3-methylbenzo[b]thiophen-2-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0469] HPLC retention time (min) : 4.56; MS (m/z) : 871 (2M + H)⁺, 436 (M + H)⁺; HPLC condition : B.

Example 7(28)

2-[1-(3,7-dimethyloct-6-enyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

15 [0470] HPLC retention time (min) : 3.48; MS (m/z) : 827 (2M + H)⁺, 414 (M + H)⁺, 207.5; HPLC condition : A.

Example 7(29)

2-[1-(4-pyrrolidinobenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

20 [0471] HPLC retention time (min) : 4.56; MS (m/z) : 869 (2M + H)⁺, 435 (M + H)⁺, 160; HPLC condition : B.

Example 7(30)

2-[1-[3-(4-t-butylphenyl)-2-methylpropyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

25 [0472] HPLC retention time (min) : 3.58; MS (m/z) : 927 (2M + H)⁺, 464 (M + H)⁺, 232.5; HPLC condition : A.

Example 7(31)

2-[1-(2-benzyloxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 [0473] HPLC retention time (min) : 4.48; MS (m/z) : 943 (2M + H)⁺, 472 (M + H)⁺; HPLC condition : B.

Example 7(32)

2-[1-[3,5-di-(t-butyl)-4-hydroxybenzyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 [0474] HPLC retention time (min) : 4.76; MS (m/z) : 987 (2M + H)⁺, 494 (M + H)⁺; HPLC condition : B.

Example 7(33)

2-[1-[3-(4-isopropylphenyl)-2-methylpropyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

45 [0475] HPLC retention time (min) : 5.06; MS (m/z) : 899 (2M + H)⁺, 450 (M + H)⁺; HPLC condition : B.

Example 7(34)

2-[1-[3,4-bis(benzyloxy)benzyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

50 [0476] HPLC retention time (min) : 4.52; MS (m/z) : 578 (M + H)⁺; HPLC condition : B.

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Example 7(35)

2-[1-(3-octyloxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0477] HPLC retention time (min) : 3.81; MS (m/z) : 987 (2M + H)⁺, 494 (M + H)⁺, 276, 219; HPLC condition : A.

Example 7(36)

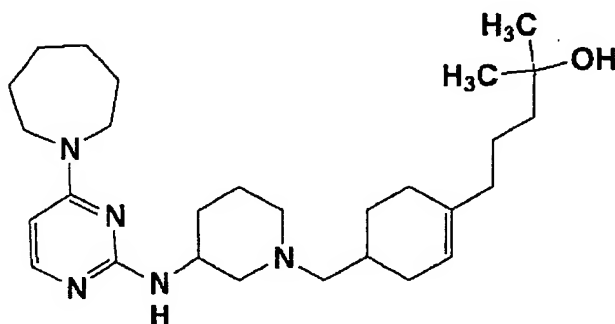
2-[1-(3,5,5-trimethylhexyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0478] HPLC retention time (min) : 3.43; MS (m/z) : 803 (2M + H)⁺, 402 (M + H)⁺, 201.5; HPLC condition : A.

Example 7(37)

2-[1-[5-(4-hydroxy-4-methylpentyl)-1,2,3,4-tetrahydrobenzen-2-ylmethyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0479]



HPLC retention time (min) : 4.42; MS (m/z) : 939 (2M + H)⁺, 470 (M + H)⁺; HPLC condition : B.

Example 7(38)

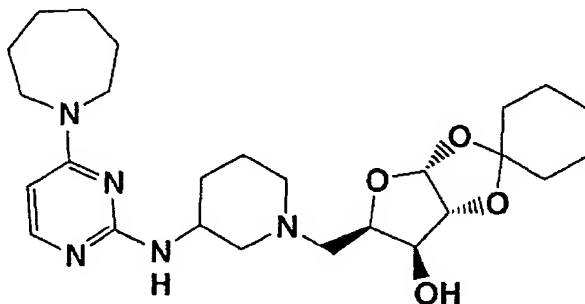
2-[1-(5-hydroxypentyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0480] HPLC retention time (min) : 3.50; MS (m/z) : 362 (M + H)⁺; HPLC condition : B.

Example 7(39)

2-[1-[(1R,2S,3R,5R)-2-hydroxy-4,6,8-trioxaspiro[bicyclo[3.3.0]octane-7,1'-cyclohexane]-3-ylmethyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0481]



EP 1 571 146 A1

HPLC retention time (min) : 3.81; MS (m/z) : 975 (2M + H)⁺, 488 (M + H)⁺, 290; HPLC condition : B.

Example 7(40)

2-[1-(3-phenylpyrazol-4-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0482] HPLC retention time (min) : 3.76; MS (m/z) : 863 (2M + H)⁺, 432 (M + H)⁺, 290; HPLC condition : B.

Example 7(41)

2-[1-(4-t-butylbenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0483] HPLC retention time (min) : 4.68; MS (m/z) : 843 (2M + H)⁺, 422 (M + H)⁺; HPLC condition : B.

Example 7(42)

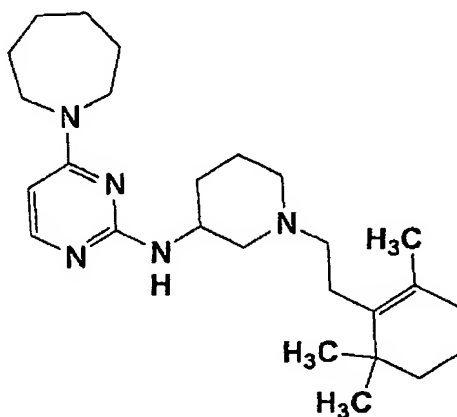
2-[1-(benzo-1,4-dioxan-6-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0484] HPLC retention time (min) : 3.98; MS (m/z) : 847 (2M + H)⁺, 424 (M + H)⁺; HPLC condition : B.

Example 7(43)

2-[1-[2-(1,1,5-trimethyl-1,2,3,4-tetrahydrobenzen-6-yl)ethyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0485]



HPLC retention time (min) : 3.48; MS (m/z) : 851 (2M + H)⁺, 426 (M + H)⁺; HPLC condition : A.

Example 7(44)

2-[1-[4-(3-dimethylaminopropoxy)benzyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0486] HPLC retention time (min) : 4.17; MS (m/z) : 933 (2M + H)⁺, 467 (M + H)⁺; HPLC condition : B.

Example 7(45)

2-[1-(2-furylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0487] HPLC retention time (min) : 3.82; MS (m/z) : 711 (2M + H)⁺, 356 (M + H)⁺; HPLC condition : B.

Example 7(46)

2-(1-isobutylpiperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

5 [0488] HPLC retention time (min) : 4.29; MS (m/z) : 663 (2M + H)⁺, 332 (M + H)⁺; HPLC condition : B.

Example 7(47)

2-(1-cyclohexylmethylpiperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

10 [0489] HPLC retention time (min) : 4.86; MS (m/z) : 743 (2M + H)⁺, 372 (M + H)⁺; HPLC condition : B.

Example 7(48)

2-[1-(2-thiazolylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

15 [0490] HPLC retention time (min) : 3.65; MS (m/z) : 745 (2M + H)⁺, 373 (M + H)⁺; HPLC condition : B.

Example 7(49)

2-[1-(4-acetylaminoethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

20 [0491] HPLC retention time (min) : 3.56; MS (m/z) : 845 (2M + H)⁺, 423 (M + H)⁺; HPLC condition : B.

25 Example 7(50)

2-[1-(2-methoxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 [0492] HPLC retention time (min) : 4.13; MS (m/z) : 791 (2M + H)⁺, 396 (M + H)⁺; HPLC condition : B.

Example 7(51)

2-[1-(4-methoxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 [0493] HPLC retention time (min) : 4.06; MS (m/z) : 791 (2M + H)⁺, 396 (M + H)⁺; HPLC condition : B.

Example 7(52)

2-[1-(4-phenylbenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 [0494] HPLC retention time (min) : 4.55; MS (m/z) : 883 (2M + H)⁺, 442 (M + H)⁺; HPLC condition : B.

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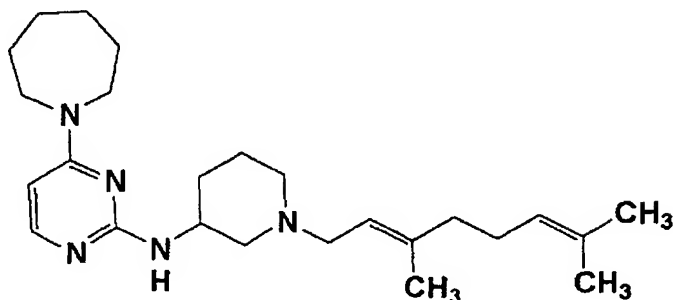
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Example 7(53)

2-[1-[(2E)-3,7-dimethyloct-2,6-dienyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0495]



HPLC retention time (min) : 4.95; MS (m/z) : 823 (2M + H)⁺, 412 (M + H)⁺; HPLC condition : B.

Example 7(54)

2-[1-(4-diethylaminobenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0496] HPLC retention time (min) : 4.55; MS (m/z) : 873 (2M + H)⁺, 437 (M + H)⁺, 162; HPLC condition : B.

Example 7(55)

2-[1-(2-ethylhexyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0497] HPLC retention time (min) : 3.36; MS (m/z) : 775 (2M + H)⁺, 388 (M + H)⁺, 276, 194; HPLC condition : A.

Example 7(56)

2-[1-(3-fluorobenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0498] HPLC retention time (min) : 4.18; MS (m/z) : 767 (2M + H)⁺, 384 (M + H)⁺; HPLC condition : B.

Example 7(57)

2-[1-(2-hydroxyethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0499] HPLC retention time (min) : 3.29; MS (m/z) : 320 (M + H)⁺; HPLC condition : B.

Example 7(58)

2-[1-(1-naphthylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0500] HPLC retention time (min) : 4.54; MS (m/z) : 831 (2M + H)⁺, 416 (M + H)⁺; HPLC condition : B.

Example 7(59)

2-[1-(3-nitrobenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0501] HPLC retention time (min) : 4.08; MS (m/z) : 821 (2M + H)⁺, 411 (M + H)⁺; HPLC condition: B.

Example 7(60)

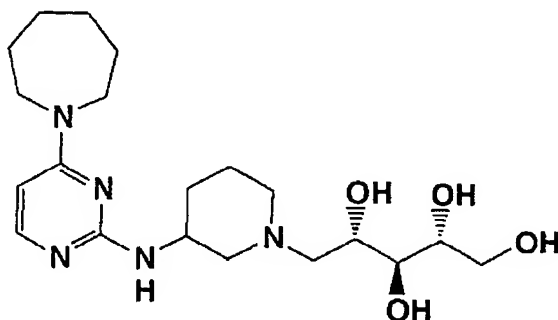
2-(1-propylpiperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0502] HPLC retention time (min) : 4.01; MS (m/z) : 635 (2M + H)⁺, 318 (M + H)⁺; HPLC condition : B.

Example 7(61)

2-[1-[(2S,3S,4R)-2,3,4,5-tetrahydroxypentyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0503]



HPLC retention time (min) : 3.11; MS (m/z) : 819 (2M + H)⁺, 410 (M + H)⁺; HPLC condition : B.

Example 7(62)

2-[1-(2-thienomethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0504] HPLC retention time (min) : 4.05; MS (m/z) : 743 (2M + H)⁺, 372 (M + H)⁺; HPLC condition : B.

Example 7(63)

2-[1-(4-chlorobenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0505] HPLC retention time (min) : 4.35; MS (m/z) : 801 (2M + H)⁺, 400 (M + H)⁺; HPLC condition : B.

Example 7(64)

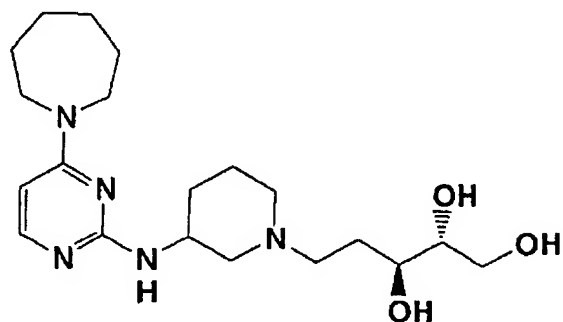
2-[1-(2,3-dimethoxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0506] HPLC retention time (min) : 4.08; MS (m/z) : 426 (M + H)⁺; HPLC condition : B.

Example 7(65)

2-[1-[(3S,4R)-3,4,5-trihydroxypentyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0507]

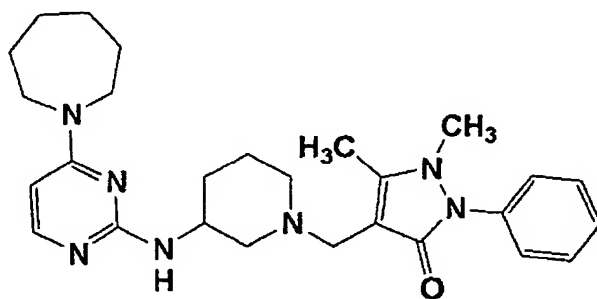


HPLC retention time (min) : 3.18; MS (m/z) : 787 (2M + H)⁺, 394 (M + H)⁺; HPLC condition : B.

Example 7(66)

2-[1-(1,5-dimethyl-2-phenyl-3-oxo-2,3-dihydro-1H-pyrazol-4-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0508]

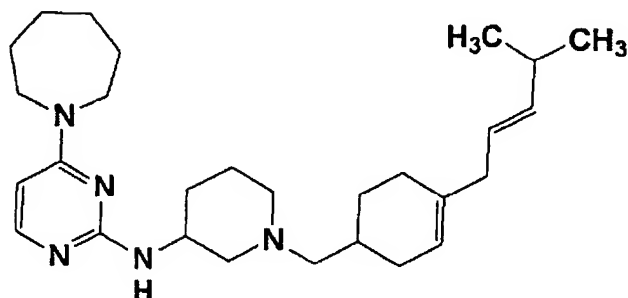


HPLC retention time (min) : 3.52; MS (m/z) : 951 (2M + H)⁺, 476 (M + H)⁺; HPLC condition : B.

Example 7(67)

2-[1-[5-[(E)-4-methylpent-2-enyl]-1,2,3,4-tetrahydrobenzen-2-ylmethyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0509]



HPLC retention time (min) : 3.57; MS (m/z) : 903 (2M + H)⁺, 452 (M + H)⁺, 276; HPLC condition: A.

Example 7(68)

2-[1-(4-hexyloxy-3-methoxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0510] HPLC retention time (min) : 4.76; MS (m/z) : 991 (2M + H)⁺, 496 (M + H)⁺; HPLC condition : B.

Example 7(69)

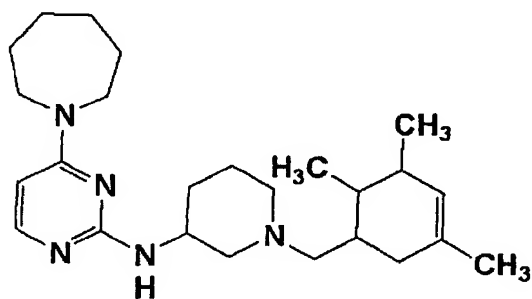
2-[1-(4-fluorobenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0511] HPLC retention time (min) : 4.16; MS (m/z) : 767 (2M + H)⁺, 384 (M + H)⁺; HPLC condition : B.

Example 7(70)

2-[1-(1,2,5-trimethyl-1,2,3,4-tetrahydrobenzen-3-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0512]



HPLC retention time (min) : 5.11; MS (m/z) : 823 (2M + H)⁺, 412 (M + H)⁺; HPLC condition : B.

Example 7(71)

2-[1-(3,5-dimethyl-1-phenylpyrazol-4-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0513] HPLC retention time (min) : 4.04; MS (m/z) : 919 (2M + H)⁺, 460 (M + H)⁺; HPLC condition : B.

Example 7(72)

2-[1-(2-benzyloxyethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0514] HPLC retention time (min) : 4.06; MS (m/z) : 410 (M + H)⁺; HPLC condition : B.

Example 7(73)

2-[1-(4-benzyloxy-3-methoxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10

[0515] HPLC retention time (min) : 4.29; MS (m/z) : 502 (M + H)⁺; HPLC condition : B.

Example 7(74)

15 2-[1-(3-benzyloxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0516] HPLC retention time (min) : 4.45; MS (m/z) : 943 (2M + H)⁺, 472 (M + H)⁺; HPLC condition : B.

Example 7(75)

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2-[1-(4-benzyloxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0517] HPLC retention time (min) : 4.44; MS (m/z) : 943 (2M + H)⁺, 472 (M + H)⁺; HPLC condition : B.

25 Example 7(76)

2-[1-(4-phenoxybenzyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0518] HPLC retention time (min) : 4.51; MS (m/z) : 915 (2M + H)⁺, 458 (M + H)⁺; HPLC condition : B.

30

Example 7(77)

2-[2-[N-methyl-N-(2,4,6-trimethoxybenzyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 [0519] HPLC retention time (min) : 4.16; MS (m/z) : 430 (M + H)⁺, 416; HPLC condition : B.

Example 7(78)

2-[2-[N-methyl-N-(3-methylbutyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

40

[0520] HPLC retention time (min) : 4.26; MS (m/z) : 320 (M + H)⁺; HPLC condition : B.

Example 7(79)

45 2-[2-[N-(2-carboxymethyloxybenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0521] HPLC retention time (min) : 2.97; MS (m/z) : 827 (2M + H)⁺, 414 (M + H)⁺; HPLC condition : B.

Example 7(80)

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2-[2-[N-(4-dimethylaminobenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0522] HPLC retention time (min) : 4.11; MS (m/z) : 383 (M + H)⁺, 134; HPLC condition : B.

55

Example 7(81)

2-[2-(N-carboxymethyl-N-methylamino)ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0523] HPLC retention time (min) : 2.77; MS (m/z) : 615 (2M + H)⁺, 308 (M + H)⁺; HPLC condition : B.

Example 7(82)

2-[2-(N-cyclopropylmethyl-N-methylamino)ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0524] HPLC retention time (min) : 3.88; MS (m/z) : 304 (M + H)⁺; HPLC condition : B.

Example 7(83)

15 2-[2-[N-methyl-N-(3-methylthiopropyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0525] HPLC retention time (min) : 3.86; MS (m/z) : 338 (M + H)⁺; HPLC condition : B.

Example 7(84)

20 2-[2-[N-(3-carboxypropyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0526] HPLC retention time (min) : 2.81; MS (m/z) : 671 (2M + H)⁺, 336 (M + H)⁺; HPLC condition: B.

25 Example 7(85)

2-[2-[N-(2,6-dimethylhept-5-enyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0527] HPLC retention time (min) : 4.84; MS (m/z) : 374 (M + H)⁺; HPLC condition : B.

Example 7(86)

2-[2-[N-(2,2-dimethylpropyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 [0528] HPLC retention time (min) : 4.41; MS (m/z) : 320 (M + H)⁺; HPLC condition : B.

Example 7(87)

2-[2-[N-[(Z)-dec-4-enyl]-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 [0529] HPLC retention time (min) : 5.13; MS (m/z) : 388 (M + H)⁺; HPLC condition : B.

Example 7(88)

45 2-[2-[N-methyl-N-(3-phenylpropyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0530] HPLC retention time (min) : 4.22; MS (m/z) : 368 (M + H)⁺; HPLC condition : B.

Example 7(89)

50 2-[2-(N-butyl-N-methylamino)ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0531] HPLC retention time (min) : 4.11; MS (m/z) : 306 (M + H)⁺; HPLC condition : B.

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Example 7(90)

2-[2-(N-benzyl-N-methylamino)ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0532] HPLC retention time (min) : 4.05; MS (m/z) : 340 (M + H)⁺; HPLC condition : B.

Example 7(91)

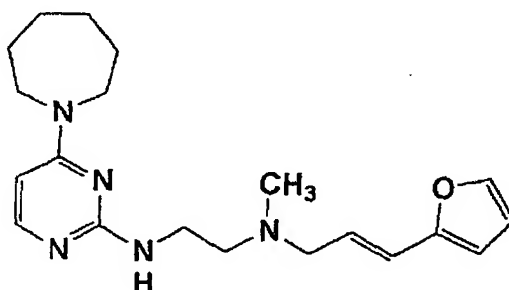
2-[2-[N-[(E)-3-(4-dimethylaminophenyl)-2-propenyl]-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0533] HPLC retention time (min) : 4.26; MS (m/z) : 817 (2M + H)⁺, 409 (M + H)⁺; HPLC condition: B.

Example 7(92)

2-[2-[N-[(E)-3-(2-furyl)-2-propenyl]-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0534]



HPLC retention time (min) : 3.95; MS (m/z) : 356 (M + H)⁺; HPLC condition : B.

Example 7(93)

2-[2-[N-(3-hydroxybenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0535] HPLC retention time (min) : 3.44; MS (m/z) : 356 (M + H)⁺, 262; HPLC condition : B.

Example 7(94)

2-[2-[N-(2-hydroxybenzyl)-N-methylaminoethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0536] HPLC retention time (min) : 3.95; MS (m/z) : 711 (2M + H)⁺, 356 (M + H)⁺; HPLC condition : B.

Example 7(95)

2-[2-[3-N-(4-heptyloxybenzyl)-N-methylaminoethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0537] HPLC retention time (min) : 5.11; MS (m/z) : 454 (M + H)⁺; HPLC condition : B.

Example 7(96)

2-[2-[N-(3,7-dimethyloct-6-enyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0538] HPLC retention time (min) : 4.98; MS (m/z) : 388 (M + H)⁺; HPLC condition : B.

Example 7(97)

2-[2-[N-methyl-N-(4-pyrrolidinobenzyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0539] HPLC retention time (min) : 4.46; MS (m/z) : 409 (M + H)⁺, 160; HPLC condition : B.

Example 7(98)

2-[2-[N-[3-(4-t-butylphenyl)-2-methylpropyl]-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0540] HPLC retention time (min) : 4.99; MS (m/z) : 438 (M + H)⁺; HPLC condition : B.

Example 7(99)

15 2-[2-[N-(2-benzyloxybenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0541] HPLC retention time (min) : 4.37; MS (m/z) : 446 (M + H)⁺; HPLC condition : B.

Example 7(100)

20 2-[2-[N-[3-(4-isopropylphenyl)-2-methylpropyl]-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0542] HPLC retention time (min) : 4.89; MS (m/z) : 424 (M + H)⁺; HPLC condition: B.

25 Example 7(101)

2-[2-[N-[3,4-bis(benzyloxy)benzyl]-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 [0543] HPLC retention time (min) : 4.10; MS (m/z) : 552 (M + H)⁺; HPLC condition : B.

Example 7(102)

2-[2-[N-(4-octyloxybenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 [0544] HPLC retention time (min) : 3.71; MS (m/z) : 468 (M + H)⁺, 219; HPLC condition : A.

Example 7(103)

2-[2-[N-methyl-N-(3,5,5-trimethylhexyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 [0545] HPLC retention time (min) : 4.98; MS (m/z) : 376 (M + H)⁺; HPLC condition: B.

Example 7(104)

45 2-[2-[N-[5-(4-hydroxy-4-methylpentyl)-1,2,3,4-tetrahydrobenzen-2-ylmethyl]-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0546] HPLC retention time (min) : 4.27; MS (m/z) : 444 (M + H)⁺; HPLC condition : B.

50 Example 7(105)

2-[2-[N-(5-hydroxypentyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

55 [0547] HPLC retention time (min) : 3.43; MS (m/z) : 336 (M + H)⁺; HPLC condition : B.

Example 7(106)

2-[2-[N-methyl-N-(3-phenylpyrazol-4-ylmethyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0548] HPLC retention time (min) : 3.68; MS (m/z) : 811 (2M + H)⁺, 406 (M + H)⁺, 278; HPLC condition : B.

Example 7(107)

2-[2-[N-(4-t-butylbenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0549] HPLC retention time (min) : 4.57; MS (m/z) : 396 (M + H)⁺; HPLC condition : B.

Example 7(108)

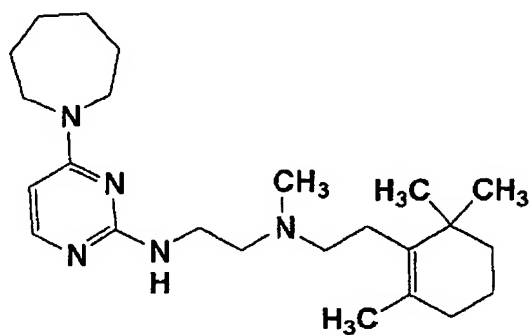
2-[2-[N-(benzo-1,4-dioxan-6-ylmethyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0550] HPLC retention time (min) : 3.91; MS (m/z) : 795 (2M + H)⁺, 398 (M + H)⁺, 292; HPLC condition : B.

Example 7(109)

2-[2-[N-methyl-N-[2-(1,1,5-trimethyl-1,2,3,4-tetrahydrohenzen-6-yl)ethyl]amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0551]



HPLC retention time (min) : 5.03; MS (m/z) : 400 (M + H)⁺, 118; HPLC condition : B.

Example 7(110)

2-[2-[N-(2-furylmethyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0552] HPLC retention time (min) : 3.78; MS (m/z) : 330 (M + H)⁺, 250; HPLC condition : B.

Example 7(111)

2-[2-[N-(4-diethylaminobenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0553] HPLC retention time (min) : 4.45; MS (m/z) : 411 (M + H)⁺, 162; HPLC condition : B.

Example 7(112)

2-[2-[N-(2-ethylhexyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0554] HPLC retention time (min) : 4.94; MS (m/z) : 362 (M + H)⁺; HPLC condition : B.

Example 7(113)

2-[2-[N-methyl-N-(naphthalen-1-ylmethyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0555] HPLC retention time (min) : 4.36; MS (m/z) : 390 (M + H)⁺; HPLC condition : B.

Example 7(114)

2-[2-(N-methyl-N-propylamino)ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0556] HPLC retention time (min) : 3.92; MS (m/z): 292 (M + H)⁺; HPLC condition : B.

Example 7(115)

15 4-(perhydroazepin-1-yl)-2-[2-[N-methyl-N-[(2S,3S,4R)-2,3,4,5-tetrahydroxypentyl]amino]ethylamino]pyrimidine

[0557] HPLC retention time (min) : 3.08; MS (m/z) : 384 (M + H)⁺; HPLC condition : B.

Example 7(116)

20 2-[2-[N-(2,3-dimethoxybenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0558] HPLC retention time (min) : 4.00; MS (m/z) : 400 (M + H)⁺, 118; HPLC condition : B.

25 Example 7(117)

2-[2-[N-methyl-N-[(3S,4R)-3,4,5-trihydroxypentyl]amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 [0559] HPLC retention time (min) : 3.13; MS (m/z) : 735 (2M + H)⁺, 368 (M + H)⁺; HPLC condition : B.

Example 7(118)

2-[2-[N-(1,5-dimethyl-2-phenyl-3-oxo-2,3-dihydro-1H-pyrazol-4-ylmethyl)-N-methylamino]ethylamino]-
4-(perhydroazepin-1-yl)pyrimidine

35 [0560] HPLC retention time (min) : 3.48; MS (m/z) : 450 (M + H)⁺; HPLC condition : B.

Example 7(119)

40 2-[2-[N-[5-[(E)-4-methylpent-2-enyl]-1,2,3,4-tetrahydrobenzen-2-ylmethyl]-N-methylamino]ethylamino]-
4-(perhydroazepin-1-yl)pyrimidine

[0561] HPLC retention time (min) : 3.50; MS (m/z) : 426 (M + H)⁺, 358, 208; HPLC condition : A.

45 Example 7(120)

2-[2-[N-methyl-N-(1,2,5-trimethyl-1,2,3,4-tetrahydrobenzen-3-ylmethyl)amino]ethylamino]-4-(perhydroazepin-1-yl)
pyrimidine

50 [0562] HPLC retention time (min) : 4.88; MS (m/z) : 386 (M + H)⁺; HPLC condition : B.

Example 7(121)

2-[2-[N-(3,5-dimethyl-1-phenylpyrazol-4-ylmethyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

55 [0563] HPLC retention time (min) : 3.95; MS (m/z) : 867 (2M + H)⁺, 434 (M + H)⁺; HPLC condition : B.

Example 7(122)

2-[2-[N-(4-benzyloxy-3-methoxybenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0564] HPLC retention time (min) : 4.21; MS (m/z) : 951 (2M + H)⁺, 476 (M + H)⁺; HPLC condition : B.

Example 7(123)

2-[2-[N-(4-benzyloxybenzyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0565] HPLC retention time (min) : 4.35; MS (m/z) : 446 (M + H)⁺; HPLC condition : B.

Example 7(124)

2-[1-(2,4,6-trimethoxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0566] HPLC retention time (min) : 4.86; MS (m/z) : 456 (M + H)⁺; HPLC condition : B.

Example 7(125)

2-[1-(2-carboxymethyloxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0567] HPLC retention time (min) : 3.04; MS (m/z) : 879 (2M + H)⁺, 440 (M + H)⁺; HPLC condition : B.

Example 7(126)

2-[1-(4-dimethylaminobenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0568] HPLC retention time (min) : 4.38; MS (m/z) : 409 (M + H)⁺, 134; HPLC condition : B.

Example 7(127)

2-[1-(3-phenoxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0569] HPLC retention time (min) : 4.58; MS (m/z) : 458 (M + H)⁺; HPLC condition : B.

Example 7(128)

2-[1-[(E)-2-methyl-2-butenyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0570] HPLC retention time (min) : 4.50; MS (m/z) : 344 (M + H)⁺; HPLC condition : B.

Example 7(129)

2-(1-carboxymethylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0571] HPLC retention time (min) : 2.83; MS (m/z) : 667 (2M + H)⁺, 334 (M + H)⁺; HPLC condition : B.

Example 7(130)

2-(1-cyclopropylmethylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0572] HPLC retention time (min) : 4.11; MS (m/z) : 330 (M + H)⁺; HPLC condition : B.

Example 7(131)

2-[1-(3-methylthiopropyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0573] HPLC retention time (min) : 4.06; MS (m/z) : 364 (M + H)⁺, 276; HPLC condition : B.

Example 7(132)

2-[1-(2,6-dimethyl-hept-5-enyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0574] HPLC retention time (min) : 3.34; MS (m/z) : 400 (M + H)⁺, 276, 200.5; HPLC condition : A.

Example 7(133)

2-(1-neopentylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0575] HPLC retention time (min) : 4.71; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

Example 7(134)

2-[1-[(Z)-dec-4-enyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0576] HPLC retention time (min) : 3.49; MS (m/z) : 414 (M + H)⁺, 207.5; HPLC condition : A.

Example 7(135)

2-[1-(3-phenylpropyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0577] HPLC retention time (min): 4.46; MS (m/z) : 394 (M + H)⁺; HPLC condition : B.

Example 7(136)

2-(1-butylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

35 [0578] HPLC retention time (min) : 4.36; MS (m/z) : 332 (M + H)⁺; HPLC condition : B.

Example 7(137)

2-(1-benzylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

40 [0579] HPLC retention time (min) : 4.26; MS (m/z) : 366 (M + H)⁺; HPLC condition : B.

Example 7(138)

2-[1-[(E)-3-(4-dimethylaminophenyl)-2-propenyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0580] HPLC retention time (min) : 4.54; MS (m/z) : 435 (M + H)⁺, 160; HPLC condition : B.

Example 7(139)

2-[1-[(E)-3-(2-furyl)-2-propenyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0581] HPLC retention time (min) : 4.15; MS (m/z) : 382 (M + H)⁺; HPLC condition : B.

Example 7(140)

2-[1-(3-hydroxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0582] HPLC retention time (min) : 3.62; MS (m/z) : 763 (2M + H)⁺, 382 (M + H)⁺; HPLC condition : B.

Example 7(141)

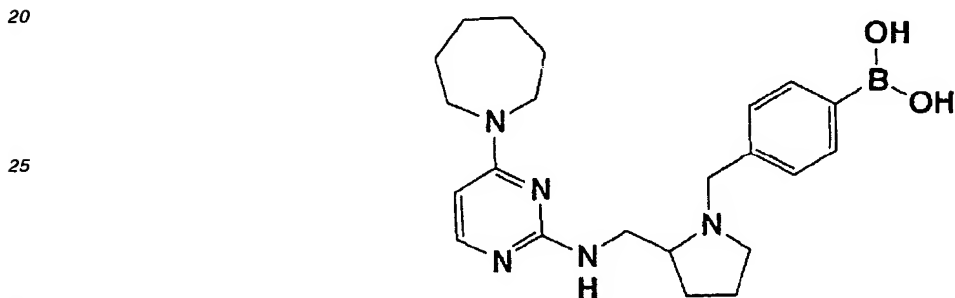
2-[1-(2-hydroxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0583] HPLC retention time (min) : 4.12; MS (m/z) : 382 (M + H)⁺, 276; HPLC condition : B.

Example 7(142)

15 2-[1-(4-dihydroxyborylbenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0584]



HPLC retention time (min) : 3.20; MS (m/z) : 410 (M + H)⁺; HPLC condition : B.

Example 7(143)

35 2-[1-(4-heptyloxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0585] HPLC retention time (min) : 3.62; MS (m/z) : 480 (M + H)⁺, 276; HPLC condition : A.

40 Example 7(144)

2-[1-(3-methylbenzo[b]thiophen-2-ylmethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

45 [0586] HPLC retention time (min) : 4.63; MS (m/z) : 436 (M + H)⁺; HPLC condition : B.

Example 7(145)

2-[1-(3,7-dimethyloct-6-enyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

50 [0587] HPLC retention time (min) : 3.43; MS (m/z) : 414 (M + H)⁺, 207.5; HPLC condition : A.

Example 7(146)

2-[1-(4-pyrrolidinobenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

55 [0588] HPLC retention time (min) : 4.83; MS (m/z) : 435 (M + H)⁺; HPLC condition : B.

Example 7(147)

2-[1-[3-(4-t-butylphenyl)-2-methylpropyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0589] HPLC retention time (min) : 3.53; MS (m/z) : 464 (M + H)⁺, 232.5; HPLC condition : A.

Example 7(148)

2-[1-(2-benzyloxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0590] HPLC retention time (min) : 4.58; MS (m/z) : 472 (M + H)⁺; HPLC condition : B.

Example 7(149)

2-[1-[3-(4-isopropylphenyl)-2-methylpropyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0591] HPLC retention time (min) : 3.46; MS (m/z) : 450 (M + H)⁺, 225.5; HPLC condition: A.

Example 7(150)

2-[1-[3,4-bis(benzyloxy)benzyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0592] HPLC retention time (min) : 4.72; MS (m/z) : 578 (M + H)⁺; HPLC condition : B.

Example 7(151)

2-[1-[5-(4-hydroxy-4-methylpentyl)-1,2,3,4-tetrahydrobenzen-2-ylmethyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0593] HPLC retention time (min) : 4.58; MS (m/z) : 470 (M + H)⁺; HPLC condition : B.

Example 7(152)

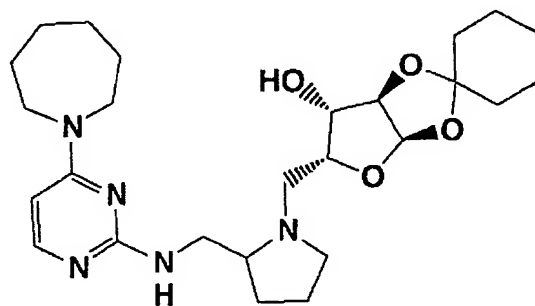
2-[1-(5-hydroxypentyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0594] HPLC retention time (min) : 3.58; MS (m/z) : 362 (M + H)⁺; HPLC condition : B.

Example 7(153)

2-[1-[(1R,2S,3R,5R)-2-hydroxy-4,6,8-trioxaspiro[bicyclo[3.3.0]octane-7,1'-cyclohexane]-3-ylmethyl]pyrrolidin-2-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0595]



HPLC retention time (min) : 3.99; MS (m/z) : 488 (M + H)⁺, 276; HPLC condition : B.

Example 7(154)

2-[1-(3-phenylpyrazol-4-ylmethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0596] HPLC retention time (min) : 3.79; MS (m/z) : 863 (2M + H)⁺, 432 (M + H)⁺, 290; HPLC condition : B.

Example 7(155)

2-[1-(4-t-butylbenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0597] HPLC retention time (min) : 4.83; MS (m/z) : 422 (M + H)⁺; HPLC condition : B.

Example 7(156)

2-[1-(1,4-benzodioxan-6-ylmethyl)pyrrolidin-2-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0598] HPLC retention time (min) : 4.13; MS (m/z) : 424 (M + H)⁺, 276; HPLC condition : B.

Example 7(157)

2-[1-[2-(1,1,5-trimethyl-1,2,3,4-tetrahydrobenzen-6-yl)ethyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0599] HPLC retention time (min) : 3.41; MS (m/z) : 426 (M + H)⁺, 276, 213.5; HPLC condition : A.

Example 7(158)

2-[1-[4-(3,3-dimethylaminopropoxy)benzyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0600] HPLC retention time (min) : 4.36; MS (m/z) : 467 (M + H)⁺, 234; HPLC condition : B.

Example 7(159)

2-[1-(2-furylmethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0601] HPLC retention time (min) : 3.94; MS (m/z) : 356 (M + H)⁺; HPLC condition : B.

Example 7(160)

2-(1-isobutylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0602] HPLC retention time (min) : 4.48; MS (m/z) : 332 (M + H)⁺; HPLC condition : B.

Example 7(161)

2-(1-cyclohexylmethylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0603] HPLC retention time (min) : 5.06; MS (m/z) : 372 (M + H)⁺; HPLC condition : B.

Example 7(162)

2-[1-(4-acetylaminobenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0604] HPLC retention time (min) : 3.65; MS (m/z) : 845 (2M + H)⁺, 423 (M + H)⁺; HPLC condition : B.

Example 7(163)

2-[1-(2-methoxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0605] HPLC retention time (min) : 4.32; MS (m/z) : 396 (M + H)⁺; HPLC condition : B.

Example 7(164)

2-[1-(4-methoxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0606] HPLC retention time (min): 4.19; MS (m/z) : 396 (M + H)⁺; HPLC condition : B.

Example 7(165)

2-[1-(4-phenylbenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

15 [0607] HPLC retention time (min) : 4.66; MS (m/z) : 442 (M + H)⁺; HPLC condition : B.

Example 7(166)

2-[1-[(2E)-3,7-dimethyloct-2,6-dienyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

20 [0608] HPLC retention time (min) : 3.40; MS (m/z) : 412 (M + H)⁺, 276; HPLC condition : A.

Example 7(167)

2-[1-(4-diethylaminobenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

25 [0609] HPLC retention time (min) : 4.78; MS (m/z) : 437 (M + H)⁺, 162; HPLC condition : B.

Example 7(168)

2-[1-(2-ethylhexyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 [0610] HPLC retention time (min) : 3.31; MS (m/z) : 388 (M + H)⁺, 194.5; HPLC condition : A.

Example 7(169)

2-[1-(naphthalen-1-ylmethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 [0611] HPLC retention time (min) : 4.56; MS (m/z) : 416 (M + H)⁺; HPLC condition : B.

Example 7(170)

2-(1-propylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

45 [0612] HPLC retention time (min) : 4.14; MS (m/z) : 318 (M + H)⁺; HPLC condition : B.

Example 7(171)

4-(perhydroazepin-1-yl)-2-[1-[(2S,3S,4R)-2,3,4,5-tetrahydroxypentyl]pyrrolidin-2-ylmethylamino]pyrimidine

50 [0613] HPLC retention time (min) : 3.18; MS (m/z) : 410 (M + H)⁺; HPLC condition : B.

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Example 7(172)

2-[1-(2-thienylmethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0614] HPLC retention time (min) : 4.15; MS (m/z) : 372 (M + H)⁺, 276; HPLC condition : B.

Example 7(173)

2-[1-(4-chlorobenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0615] HPLC retention time (min) : 4.47; MS (m/z) : 400 (M + H)⁺; HPLC condition : B.

Example 7(174)

2-[1-(2,3-dimethoxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0616] HPLC retention time (min) : 4.25; MS (m/z) : 426 (M + H)⁺; HPLC condition : B.

Example 7(175)

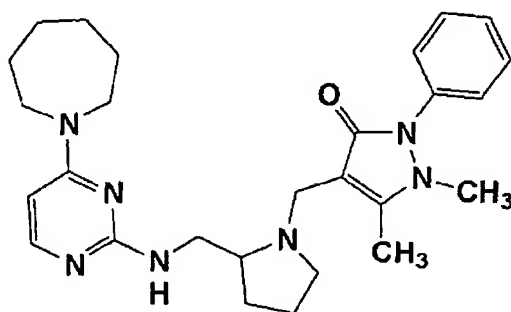
4-(perhydroazepin-1-yl)-2-[1-[(3S,4R)-3,4,5-trihydroxypentyl]pyrrolidin-2-ylmethylamino]pyrimidine

[0617] HPLC retention time (min) : 3.21; MS (m/z) : 787 (2M + H)⁺, 394 (M + H)⁺; HPLC condition : B.

Example 7(176)

2-[1-(1,5-dimethyl-2-phenyl-3-oxo-2,3-dihydro-1H-pyrazol-4-ylmethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0618]



HPLC retention time (min) : 3.68; MS (m/z) : 476 (M + H)⁺; HPLC condition : B.

Example 7(177)

2-[1-[5-[(E)-4-methyl-2-pentenyl]-1,2,3,4-tetrahydrobenzen-2-ylmethyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0619] HPLC retention time (min) : 3.53; MS (m/z) : 452 (M + H)⁺, 384, 226.5; HPLC condition : A.

Example 7(178)

2-[1-(4-hexyloxy-3-methoxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0620] HPLC retention time (min) : 4.86; MS (m/z) : 496 (M + H)⁺; HPLC condition : B.

Example 7(179)

2-[1-(4-fluorobenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 **[0621]** HPLC retention time (min) : 4.27; MS (m/z) : 384 (M + H)⁺; HPLC condition : B.

Example 7(180)

10 2-[1-(1,2,5-trimethyl-1,2,3,4-tetrahydrobenzen-3-ylmethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0622] HPLC retention time (min) : 3.32; MS (m/z) : 412 (M + H)⁺, 206.5; HPLC condition : A.

Example 7(181)

15 2-[1-(3,5-dimethyl-1-phenylpyrazol-4-ylmethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0623] HPLC retention time (min) : 4.15; MS (m/z) : 460 (M + H)⁺; HPLC condition : B.

20 Example 7(182)

2-[1-(4-benzyloxy-3-methoxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0624] HPLC retention time (min): 4.40; MS (m/z) : 502 (M + H)⁺; HPLC condition : B.

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Example 7(183)

2-[1-(3-benzyloxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 **[0625]** HPLC retention time (min): 4.56; MS (m/z) : 472 (M + H)⁺; HPLC condition : B.

Example 7(184)

2-[1-(4-benzyloxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

35

[0626] HPLC retention time (min) : 4.57; MS (m/z) : 472 (M + H)⁺; HPLC condition : B.

Example 7(185)

40 2-[1-(4-phenoxybenzyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0627] HPLC retention time (min) : 4.63; MS (m/z) : 458 (M + H)⁺; HPLC condition : B.

Example 7(186)

45

2-[2-[N-[(E)-2-butenyl]-N-methyl]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0628] HPLC retention time (min) : 3.98; MS (m/z) : 304 (M + H)⁺; HPLC condition : B.

50 Example 7(187)

2-[2-(N-methyl-N-pentyl)ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0629] HPLC retention time (min) : 4.35; MS (m/z) : 320 (M + H)⁺; HPLC condition : B.

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Example 7(188)

2-[2-[N-methyl-N-[(E)-2-pentenyl]amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0630] HPLC retention time (min) : 4.18; MS (m/z) : 318 (M + H)⁺; HPLC condition : B.

Example 7(189)

2-[2-[N-(2-ethylbutyl)-N-methyl]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0631] HPLC retention time (min) : 4.55; MS (m/z) : 334 (M + H)⁺; HPLC condition : B.

Example 7(190)

2-[2-(N-hexyl-N-methyl)ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0632] HPLC retention time (min) : 4.56; MS (m/z) : 334 (M + H)⁺; HPLC condition : B.

Example 7(191)

2-[2-[N-methyl-N-(2-methylpentyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0633] HPLC retention time (min) : 4.56; MS (m/z) : 334 (M + H)⁺; HPLC condition : B.

Example 7(192)

2-[2-[N-[(E)-2-hexenyl]-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0634] HPLC retention time (min) : 4.37; MS (m/z) : 332 (M + H)⁺; HPLC condition : B.

Example 7(193)

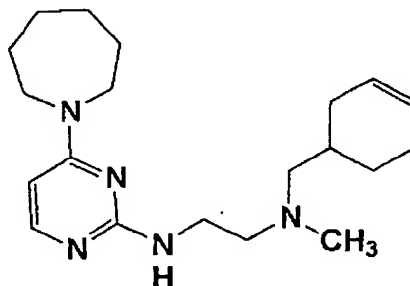
2-[2-[N-(3,3-dimethylbutyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0635] HPLC retention time (min) : 4.37; MS (m/z) : 334 (M + H)⁺; HPLC condition : B.

Example 7(194)

2-[2-[N-(1,2,3,4-tetrahydrobenzen-2-ylmethyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0636]



HPLC retention time (min) : 4.37; MS (m/z) : 344 (M + H)⁺; HPLC condition : B.

Example 7(195)

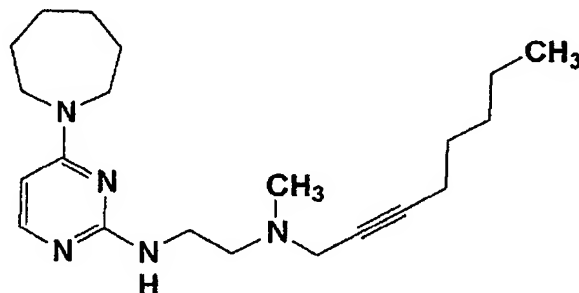
2-[2-[N-(2,3-dimethylpentyl)-N-methylamino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0637] HPLC retention time (min) : 4.71; MS (m/z) : 348 (M + H)⁺; HPLC condition : B.

Example 7(196)

2-[2-[N-methyl-(N-2-octynyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0638]



HPLC retention time (min) : 4.47; MS (m/z) : 358 (M + H)⁺; HPLC condition : B.

Example 7(197)

2-[2-[N-methyl-N-(2-propylpentyl)amino]ethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0639] HPLC retention time (min) : 4.96; MS (m/z) : 362 (M + H)⁺; HPLC condition : B.

Example 7(198)

2-[1-(2-methoxyethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0640] HPLC retention time (min) : 3.68; MS (m/z) : 334 (M + H)⁺; HPLC condition : B.

Example 7(199)

2-[1-[(E)-2-butenyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0641] HPLC retention time (min) : 4.23; MS (m/z) : 330 (M + H)⁺; HPLC condition : B.

Example 7(200)

2-(1-pentylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0642] HPLC retention time (min) : 4.62; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

Example 7(201)

2-[1-[(E)-2-pentenyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0643] HPLC retention time (min) : 4.45; MS (m/z) : 344 (M + H)⁺; HPLC condition : B.

Example 7(202)

2-[1-(2-ethylbutyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0644] HPLC retention time (min) : 4.91; MS (m/z) : 360 (M + H)⁺; HPLC condition : B.

Example 7(203)

2-(1-hexylpyrrolidin-2-ylmethylamino)-4-(perhydroazepin-1-yl)pyrimidine

10 [0645] HPLC retention time (min) : 4.91; MS (m/z) : 360 (M + H)⁺; HPLC condition : B.

Example 7(204)

15 2-[1-(2-methylpentyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0646] HPLC retention time (min) : 4.93; MS (m/z) : 360 (M + H)⁺; HPLC condition : B.

Example 7(205)

20 2-[1-[(E)-2-hexenyl]pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0647] HPLC retention time (min) : 4.68; MS (m/z) : 358 (M + H)⁺; HPLC condition : B.

25 Example 7(206)

2-[1-(3,3-dimethylbutyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 [0648] HPLC retention time (min) : 4.65; MS (m/z) : 360 (M + H)⁺; HPLC condition : B.

Example 7(207)

2-[1-(1,2,3,4-tetrahydrobenzen-2-ylmethyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 [0649] HPLC retention time (min) : 4.71; MS (m/z) : 370 (M + H)⁺; HPLC condition : B.

Example 7(208)

40 2-[1-(2,3-dimethylpentyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0650] HPLC retention time (min) : 5.11; MS (m/z) : 374 (M + H)⁺; HPLC condition : B.

Example 7(209)

45 2-[1-(2-octynyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0651] HPLC retention time (min) : 4.68; MS (m/z) : 384 (M + H)⁺; HPLC condition : B.

Example 7(210)

50 2-[1-(2-propylpentyl)pyrrolidin-2-ylmethylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0652] HPLC retention time (min) : 4.94; MS (m/z) : 388 (M + H)⁺; HPLC condition : B.

55

Example 7(211)

2-[1-(2-methoxyethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0653] HPLC retention time (min) : 3.53; MS (m/z) : 320 (M + H)⁺; HPLC condition : B.

Example 7(212)

2-[1-[(E)-2-butenyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0654] HPLC retention time (min) : 4.06; MS (m/z) : 316 (M + H)⁺; HPLC condition : B.

Example 7(213)

2-[1-(2,2-dimethoxyethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

15 [0655] HPLC retention time (min) : 3.51; MS (m/z) : 350 (M + H)⁺; HPLC condition : B.

Example 7(214)

2-(1-pentylpyrrolidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

20 [0656] HPLC retention time (min) : 4.39; MS (m/z) : 332 (M + H)⁺; HPLC condition : B.

Example 7(215)

2-[1-[(E)-2-pentenyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

25 [0657] HPLC retention time (min) : 4.24; MS (m/z) : 330 (M + H)⁺; HPLC condition : B.

Example 7(216)

2-[1-(2-ethylbutyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 [0658] HPLC retention time (min) : 4.56; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

Example 7(217)

2-(1-hexylpyrrolidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

40 [0659] HPLC retention time (min) : 4.63; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

Example 7(218)

2-[1-(2-methylpentyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

45 [0660] HPLC retention time (min) : 4.56; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

Example 7(219)

2-[1-[(E)-2-hexenyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

50 [0661] HPLC retention time (min) : 4.45; MS (m/z) : 344 (M + H)⁺; HPLC condition : B.

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Example 7(220)

2-[1-(3,3-dimethylbutyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0662] HPLC retention time (min) : 4.44; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

Example 7(221)

2-[1-(1,2,3,4-tetrahydrobenzen-2-ylmethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0663] HPLC retention time (min) : 4.39; MS (m/z) : 356 (M + H)⁺; HPLC condition : B.

Example 7(222)

2-[1-(2,3-dimethylpentyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

15 [0664] HPLC retention time (min) : 4.70; MS (m/z) : 360 (M + H)⁺; HPLC condition : B.

Example 7(223)

2-[1-(2,2-dimethyl-4-pentenyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

20 [0665] HPLC retention time (min) : 4.62; MS (m/z) : 358 (M + H)⁺; HPLC condition : B.

Example 7(224)

2-[1-(2-octynyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

25 [0666] HPLC retention time (min) : 4.53; MS (m/z) : 370 (M + H)⁺; HPLC condition : B.

Example 7(225)

2-[1-(2-propylpentyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 [0667] HPLC retention time (min) : 4.97; MS (m/z) : 374 (M + H)⁺; HPLC condition : B.

Example 7(226)

2-[1-(2-methoxyethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 [0668] HPLC retention time (min) : 3.56; MS (m/z) : 334 (M + H)⁺; HPLC condition : B.

Example 7(227)

2-[1-[(E)-2-butenyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

45 [0669] HPLC retention time (min) : 4.10; MS (m/z) : 659 (2M + H)⁺, 330 (M + H)⁺; HPLC condition : B.

Example 7(228)

2-[1-(2,2-dimethoxyethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

50 [0670] HPLC retention time (min) : 3.56; MS (m/z) : 364 (M + H)⁺; HPLC condition : B.

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Example 7(229)

2-(1-pentylpiperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

5 **[0671]** HPLC retention time (min) : 4.45; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

Example 7(230)

2-[1-[(E)-2-pentenyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 **[0672]** HPLC retention time (min) : 4.29; MS (m/z) : 344 (M + H)⁺; HPLC condition : B.

Example 7(231)

2-[1-(2-ethylbutyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0673] TLC : R_f 0.60 (chloroform : methanol: 28% ammonia water = 80 : 10 : 1);

NMR (CDCl₃) : δ 0.84 (t, J = 7.5 Hz, 6H), 1.31 (m, 5H), 1.54 (m, 6H), 1.75 (m, 6H), 2.11 (d, J = 7.0 Hz, 2H), 2.22 (m, 1H), 2.32 (m, 2H), 2.67 (m, 1H), 3.56 (m, 4H), 4.02 (m, 1H), 5.32 (m, 1H), 5.77 (d, J = 6.0 Hz, 1H), 7.77 (d, J = 6.0 Hz, 1H);

20 HPLC retention time (min) : 4.77; MS (m/z) : 719 (2M + H)⁺, 360 (M + H)⁺; HPLC condition : B.

Example 7(232)

2-(1-hexylpiperidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

25 **[0674]** HPLC retention time (min) : 4.73; MS (m/z) : 719 (2M + H)⁺, 360 (M + H)⁺; HPLC condition : B.

Example 7(233)

2-[1-(2-methylpentyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 **[0675]** HPLC retention time (min) : 4.77; MS (m/z) : 719 (2M + H)⁺, 360 (M + H)⁺; HPLC condition : B.

Example 7(234)

2-[1-[(E)-2-hexenyl]piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 **[0676]** HPLC retention time (min) : 4.51; MS (m/z) : 358 (M + H)⁺; HPLC condition : B.

Example 7(235)

2-[1-(3,3-dimethylbutyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 **[0677]** HPLC retention time (min) : 4.50; MS (m/z) : 360 (M + H)⁺; HPLC condition : B.

Example 7(236)

2-[1-(1,2,3,4-tetrahydrobenzen-2-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

45 **[0678]** HPLC retention time (min) : 4.54; MS (m/z) : 739 (2M + H)⁺, 370 (M + H)⁺; HPLC condition : B.

Example 7(237)

2-[1-(2,3-dimethylpentyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

55 **[0679]** HPLC retention time (min) : 4.96; MS (m/z) : 747 (2M + H)⁺, 374 (M + H)⁺; HPLC condition : B.

Example 7(238)

2-[1-(2-octynyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0680] HPLC retention time (min) : 4.59; MS (m/z) : 384 (M + H)⁺; HPLC condition : B.

Example 7(239)

2-[1-(2-propylpentyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0681] HPLC retention time (min) : 5.09; MS (m/z) : 775 (2M + H)⁺, 388 (M + H)⁺; HPLC condition : B.

Example 7(240)

4-(perhydroazepin-1-yl)-2-[1-(2,4,6-trimethoxybenzyl)pyrrolidin-3-ylamino]pyrimidine

[0682] HPLC retention time (min) : 4.19; MS (m/z) : 442 (M + H)⁺; HPLC condition : B.

Example 7(241)

2-[1-(3-cyanobenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

20 [0683] HPLC retention time (min) : 3.86; MS (m/z) : 753 (2M + H)⁺, 377 (M + H)⁺; HPLC condition : B.

Example 7(242)

2-[1-(3-methylbutyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0684] HPLC retention time (min) : 4.33; MS (m/z) : 332 (M + H)⁺; HPLC condition : B.

Example 7(243)

2-[1-(2-carboxymethoxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 [0685] HPLC retention time (min) : 3.00; MS (m/z) : 851 (2M + H)⁺, 426 (M + H)⁺; HPLC condition : B.

Example 7(244)

2-[1-(4-dimethylaminobenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 [0686] HPLC retention time (min) : 4.00; MS (m/z) : 395 (M + H)⁺; HPLC condition : B.

Example 7(245)

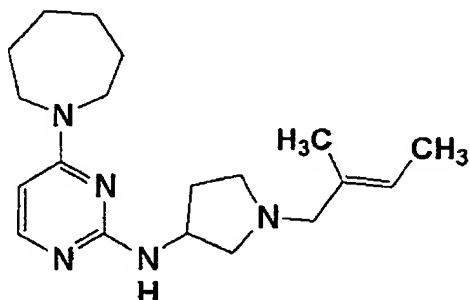
4-(perhydroazepin-1-yl)-2-[1-(3-phenoxybenzyl)pyrrolidin-3-ylamino]pyrimidine

45 [0687] HPLC retention time (min) : 4.37; MS (m/z) : 444 (M + H)⁺; HPLC condition : B.

Example 7(246)

2-[1-[(E)-2-methyl-2-butenyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

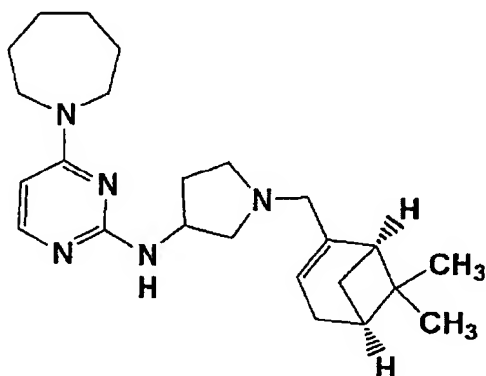
[0688]

HPLC retention time (min) : 4.21; MS (m/z) : 330(M+H)⁺; HPLC condition : B.

Example 7(247)

2-[1-[(1R)-6,6-dimethylbicyclo[3.1.1]hept-2-en-2-ylmethyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0689]

HPLC retention time (min) : 4.87; MS (m/z) : 396 (M + H)⁺; HPLC condition : B.

Example 7(248)

2-[1-[(Z)-4-decenyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0690] HPLC retention time (min) : 5.34; MS (m/z) : 400 (M + H)⁺; HPLC condition : B.

Example 7(249)

4-(perhydroazepin-1-yl)-2-[1-(3-phenylpropyl)pyrrolidin-3-ylamino]pyrimidine

[0691] HPLC retention time (min) : 4.30; MS (m/z) : 380 (M + H)⁺; HPLC condition : B.

Example 7(250)

2-(1-butylpyrrolidin-3-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0692] HPLC retention time (min) : 4.19; MS (m/z) : 318 (M + H)⁺; HPLC condition : B.

Example 7(251)

2-[1-[(E)-3-(4-dimethylaminophenyl)-2-propenyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0693] HPLC retention time (min) : 4.01; MS (m/z): 421 (M + H)⁺; HPLC condition : B.

Example 7(252)

2-[1-(3-hydroxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0694] HPLC retention time (min) : 3.38; MS (m/z) : 735 (2M + H)⁺, 368 (M + H)⁺; HPLC condition : B.

Example 7(253)

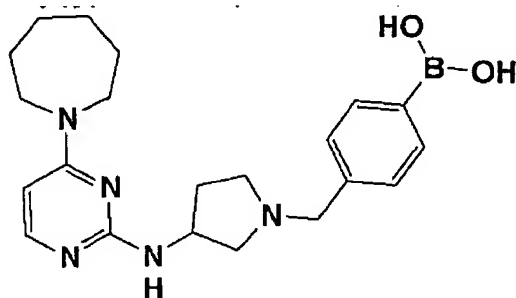
2-[1-(2-hydroxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0695] HPLC retention time (min) : 3.97; MS (m/z) : 735 (2M + H)⁺, 368 (M + H)⁺; HPLC condition : B.

Example 7(254)

2-[1-(4-dihydroxyborylbenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0696]



HPLC retention time (min) : 3.03; MS (m/z) : 396 (M + H)⁺; HPLC condition : B.

Example 7(255)

2-[1-(4-heptyloxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0697] HPLC retention time (min) : 5.16; MS (m/z) : 466 (M + H)⁺, 398; HPLC condition : B.

Example 7(256)

2-[1-(benzo[b]furan-2-ylmethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0698] HPLC retention time (min) : 4.08; MS (m/z): 392 (M + H)⁺; HPLC condition : B.

Example 7(257)

2-[1-(3-methylbenzo[b]thiophen-2-ylmethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 **[0699]** HPLC retention time (min) : 4.37; MS (m/z) : 843 (2M + H)⁺, 422 (M + H)⁺; HPLC condition : B.

Example 7(258)

2-[1-[2-(4-chlorophenylthio)benzyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 **[0700]** HPLC retention time (min) : 4.85; MS (m/z) : 496, 494(M + H)⁺, 398; HPLC condition : B.

Example 7(259)

15 2-[1-(3,7-dimethyl-6-octenyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0701] HPLC retention time (min) : 5.10; MS (m/z) : 400 (M + H)⁺; HPLC condition : B.

Example 7(260)

20 4-(perhydroazepin-1-yl)-2-[1-(4-pyrrolidinobenzyl)pyrrolidin-3-ylamino]pyrimidine

[0702] HPLC retention time (min) : 4.46; MS (m/z) : 421 (M + H)⁺; HPLC condition : B.

25 Example 7(261)

2-[1-[2-methyl-3-(4-t-butylphenyl)propyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 **[0703]** HPLC retention time (min) : 5.03; MS (m/z) : 450 (M + H)⁺; HPLC condition : B.

Example 7(262)

2-[1-(2-benzyloxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 **[0704]** HPLC retention time (min) : 4.37; MS (m/z) : 458 (M + H)⁺; HPLC condition : B.

Example 7(263)

40 2-[1-[3,5-di-(t-butyl)-4-hydroxybenzyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0705] HPLC retention time (min) : 4.63; MS (m/z) : 480 (M + H)⁺; HPLC condition : B.

Example 7(264)

45 2-[1-[3-(4-isopropylphenyl)-2-methylpropyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0706] HPLC retention time (min) : 4.94; MS (m/z) : 436 (M + H)⁺; HPLC condition : B.

Example 7(265)

50 2-[1-[3,4-bis(benzyloxy)benzyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0707] HPLC retention time (min) : 4.48; MS (m/z) : 564 (M + H)⁺; HPLC condition : B.

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Example 7(266)

4-(perhydroazepin-1-yl)-2-[1-(3,5,5-trimethylhexyl)pyrrolidin-3-ylamino]pyrimidine

[0708] HPLC retention time (min) : 5.11; MS (m/z) : 388 (M + H)⁺; HPLC condition : B.

Example 7(267)

2-[1-(butoxycarbonylmethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0709] HPLC retention time (min) : 3.91; MS (m/z) : 376 (M + H)⁺, 260; HPLC condition : B.

Example 7(268)

2-[1-[5-(4-hydroxy-4-methylpentyl)-1,2,3,4-tetrahydrobenzen-2-ylmethyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0710] HPLC retention time (min) : 4.26; MS (m/z); 456 (M + H)⁺; HPLC condition : B.

Example 7(269)

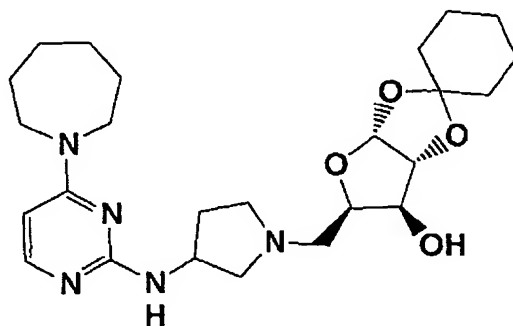
2-[1-(5-hydroxypentyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0711] HPLC retention time (min) : 3.45; MS (m/z) : 348 (M + H)⁺; HPLC condition : B.

Example 7(270)

2-[1-[(1R,2S,3R,5R)-2-hydroxy-4,6,8-trioxaspiro[bicyclo[3.3.0]octane-7,1'-cyclohexane]-3-ylmethyl]pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0712]



HPLC retention time (min) : 3.77; MS (m/z): 474 (M + H)⁺; HPLC condition : B.

Example 7(271)

4-(perhydroazepin-1-yl)-2-[1-(3-phenylpyrazol-4-ylmethyl)pyrrolidin-3-ylamino]pyrimidine

[0713] HPLC retention time (min) : 3.69; MS (m/z) : 835 (2M + H)⁺, 418 (M + H)⁺; HPLC condition : B.

Example 7(272)

2-[1-(4-t-butylbenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0714] HPLC retention time (min) : 4.54; MS (m/z) : 408 (M + H)⁺; HPLC condition : B.

Example 7(273)

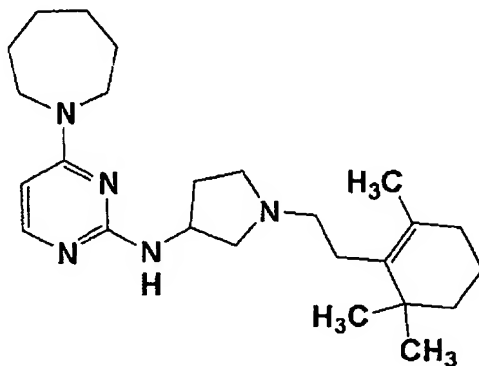
2-[1-(1,4-benzodioxan-6-ylmethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0715] HPLC retention time (min) : 3.88; MS (m/z) : 410 (M + H)⁺; HPLC condition : B.

Example 7(274)

4-(perhydroazepin-1-yl)-2-[1-[2-(1,1,5-trimethyl-1,2,3,4-tetrahydrobenzen-6-yl)ethyl]pyrrolidin-3-ylamino]pyrimidine

[0716]

HPLC retention time (min): 5.23; MS (m/z) : 412 (M + H)⁺; HPLC condition : B.

Example 7(275)

4-(perhydroazepin-1-yl)-2-[1-[4-(3-dimethylaminopropoxy)benzyl]pyrrolidin-3-ylamino]pyrimidine

[0717] HPLC retention time (min) : 4.08; MS (m/z) : 453 (M + H)⁺; HPLC condition : B.

Example 7(276)

2-[1-(2-furylmethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0718] HPLC retention time (min) : 3.78; MS (m/z) : 342 (M + H)⁺; HPLC condition : B.

Example 7(277)

4-(perhydroazepin-1-yl)-2-[1-(2-thiazolylmethyl)pyrrolidin-3-ylamino]pyrimidine

[0719] HPLC retention time (min) : 3.56; MS (m/z): 359 (M + H)⁺; HPLC condition : B.

Example 7(278)

2-[1-(4-acetylaminobenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0720] HPLC retention time (min) : 3.47; MS (m/z) : 817 (2M + H)⁺, 409 (M + H)⁺; HPLC condition : B.

Example 7(279)

2-[1-(2-methoxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0721] HPLC retention time (min) : 4.06; MS (m/z) : 382 (M + H)⁺; HPLC condition : B.

Example 7(280)

2-[1-(4-methoxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0722] HPLC retention time (min) : 3.95; MS (m/z) : 382 (M + H)⁺; HPLC condition : B.

Example 7(281)

4-(perhydroazepin-1-yl)-2-[1-(4-phenylbenzyl)pyrrolidin-3-ylamino]pyrimidine

10 [0723] HPLC retention time (min) : 4.41; MS (m/z) : 855 (2M + H)⁺, 428 (M + H)⁺; HPLC condition : B.

Example 7(282)

15 2-[1-((2E)-3,7-dimethyl-2,6-octadienyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0724] HPLC retention time (min) : 4.94; MS (m/z); 398 (M + H)⁺; HPLC condition: B.

Example 7(283)

20 2-[1-(4-diethylaminobenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0725] HPLC retention time (min) : 4.44; MS (m/z) : 423 (M + H)⁺; HPLC condition : B.

25 Example 7(284)

2-[1-(2-ethylhexyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 [0726] HPLC retention time (min) : 4.99; MS (m/z): 374 (M + H)⁺; HPLC condition : B.

Example 7(285)

2-[1-(3-fluorobenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 [0727] HPLC retention time (min) : 4.04; MS (m/z) : 370 (M + H)⁺; HPLC condition : B.

Example 7(286)

2-[1-(2-hydroxyethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 [0728] HPLC retention time (min) : 3.27; MS (m/z) : 306 (M + H)⁺; HPLC condition: B.

Example 7(287)

45 2-[1-(1-naphthylmethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0729] HPLC retention time (min) : 4.33; MS (m/z) : 402 (M + H)⁺; HPLC condition : B.

Example 7(288)

50 2-[1-(3-nitrobenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0730] HPLC retention time (min) : 3.93; MS (m/z) : 793 (2M + H)⁺, 397 (M + H)⁺; HPLC condition : B.

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Example 7(289)

4-(perhydroazepin-1-yl)-2-[1-((2S,3S,4R)-2,3,4,5-tetrahydroxypentyl)pyrrolidin-3-ylamino]pyrimidine

[0731] HPLC retention time (min) : 3.07; MS (m/z) : 791 (2M + H)⁺, 396 (M + H)⁺; HPLC condition : B.

Example 7(290)

4-(perhydroazepin-1-yl)-2-[1-(2-thienylmethyl)pyrrolidin-3-ylamino]pyrimidine

[0732] HPLC retention time (min) : 3.95; MS (m/z) : 358 (M + H)⁺; HPLC condition : B.

Example 7(291)

2-[1-(4-chlorobenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0733] HPLC retention time (min) : 4.21; MS (m/z) : 388, 386 (M + H)⁺; HPLC condition : B.

Example 7(292)

2-[1-(1,3-benzodioxol-4-ylmethyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0734] HPLC retention time (min) : 3.93; MS (m/z) : 396 (M + H)⁺; HPLC condition : B.

Example 7(293)

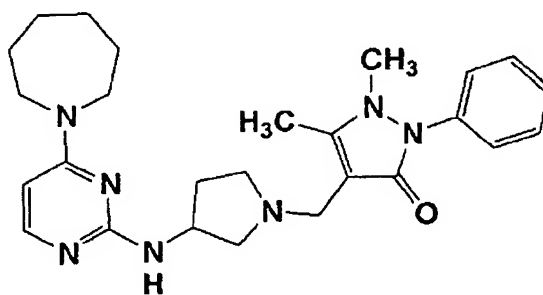
4-(perhydroazepin-1-yl)-2-[1-((3S,4R)-3,4,5-trihydroxypentyl)pyrrolidin-3-ylamino]pyrimidine

[0735] HPLC retention time (min) : 3.14; MS (m/z) : 759 (2M + H)⁺, 380 (M + H)⁺; HPLC condition : B.

Example 7(294)

2-[1-(1,5-dimethyl-2-phenyl-3-oxo-2,3-dihydro-1H-pyrazol-4-ylmethyl)piperidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0736]

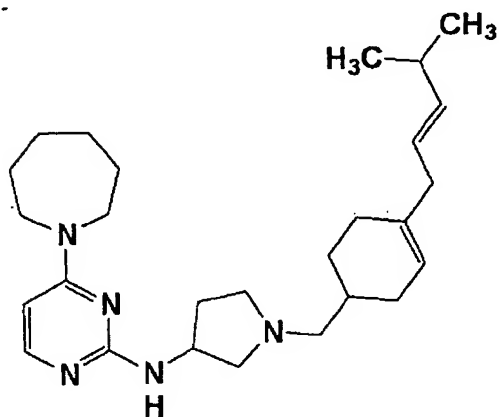


HPLC retention time (min) : 3.49; MS (m/z) : 923 (2M + H)⁺, 462 (M + H)⁺; HPLC condition : B.

Example 7(295)

4-(perhydroazepin-1-yl)-2-[1-[5-[(E)-4-methyl-2-pentenyl]-1,2,3,4-tetrahydrobenzen-2-yl]pyrrolidin-3-ylamino]pyrimidine

[0737]



HPLC retention time (min): 5.43; MS (m/z) : 438 (M + H)⁺; HPLC condition : B.

Example 7(296)

2-[1-(3-methoxy-4-hexyloxybenzyl)pyrrolidin-3-ylamino]4-(perhydroazepin-1-yl)pyrimidine

[0738] HPLC retention time (min) : 4.59; MS (m/z) : 963 (2M + H)⁺, 482 (M + H)⁺; HPLC condition : B.

Example 7(297)

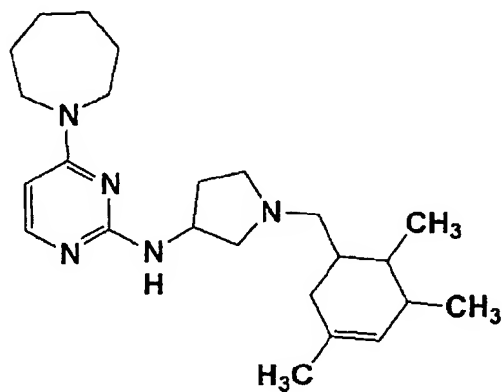
4-(perhydroazepin-1-yl)-2-[1-(4-fluorobenzyl)pyrrolidin-3-ylamino]pyrimidine

[0739] HPLC retention time (min) : 4.02; MS (m/z) : 370 (M + H)⁺; HPLC condition : B.

Example 7(298)

4-(perhydroazepin-1-yl)-2-[1-(1,2,5-trimethyl-1,2,3,4-tetrahydrobenzen-3-ylmethyl)pyrrolidin-3-ylamino]pyrimidine

[0740]



EP 1 571 146 A1

HPLC retention time (min) : 4.98; MS (m/z) : 398 (M + H)⁺; HPLC condition : B.

Example 7(299)

4-(perhydroazepin-1-yl)-2-[1-(3,5-dimethyl-1-phenylpyrazol-4-ylmethyl)pyrrolidin-3-ylamino]pyrimidine

[0741] HPLC retention time (min) : 3.91; MS (m/z) : 891 (2M + H)⁺, 446 (M + H)⁺; HPLC condition : B.

Example 7(300)

2-[1-(4-benzyloxy-3-methoxybenzyl)pyrrolidin-3-ylamino]4-(perhydroazepin-1-yl)pyrimidine

[0742] HPLC retention time (min) : 4.19; MS (m/z) : 975 (2M + H)⁺, 488 (M + H)⁺; HPLC condition : B.

Example 7(301)

2-[1-(3-benzyloxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0743] HPLC retention time (min) : 4.33; MS (m/z) : 458 (M + H)⁺; HPLC condition : B.

Example 7(302)

2-[1-(4-benzyloxybenzyl)pyrrolidin-3-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0744] HPLC retention time (min) : 4.32; MS (m/z) : 915 (2M + H)⁺, 458 (M + H)⁺; HPLC condition : B.

Example 7(303)

4-(perhydroazepin-1-yl)-2-[1-(4-phenoxybenzyl)pyrrolidin-3-ylamino]pyrimidine

[0745] HPLC retention time (min) : 4.41; MS (m/z) : 887 (2M + H)⁺, 444 (M + H)⁺; HPLC condition : B.

Example 7(304)

4-(perhydroazepin-1-yl)-2-[1-(2,4,6-trimethoxybenzyl)piperidin-4-ylamino]pyrimidine

[0746] HPLC retention time (min) : 4.13; MS (m/z) : 911 (2M + H)⁺, 456 (M + H)⁺; HPLC condition : B.

Example 7(305)

2-[1-(3-cyanobenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0747] HPLC retention time (min) : 3.95; MS (m/z) : 781 (2M + H)⁺, 391 (M + H)⁺; HPLC condition : B.

Example 7(306)

2-[1-(3-methylbutyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0748] HPLC retention time (min) : 4.33; MS (m/z) : 346 (M + H)⁺; HPLC condition : B.

Example 7(307)

2-[1-(2-carboxymethoxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0749] HPLC retention time (min) : 3.03; MS (m/z) : 879 (2M + H)⁺, 440 (M + H)⁺; HPLC condition : B.

Example 7(308)

2-[1-(4-dimethylaminobenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0750] HPLC retention time (min) : 4.19; MS (m/z) : 817 (2M + H)⁺, 409 (M + H)⁺; HPLC condition : B.

Example 7(309)

4-(perhydroazepin-1-yl)-2-[1-(3-phenoxybenzyl)piperidin-4-ylamino]pyrimidine

[0751] HPLC retention time (min) : 4.50; MS (m/z) : 915 (2M + H)⁺, 458 (M + H)⁺; HPLC condition : B.

Example 7(310)

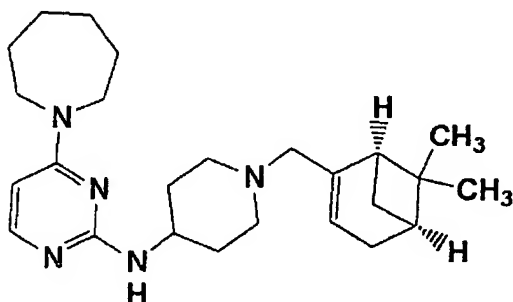
2-[1-[(E)-2-methyl-2-butenyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0752] HPLC retention time (min) : 4.37; MS (m/z) : 687 (2M + H)⁺, 344 (M + H)⁺; HPLC condition: B.

Example 7(311)

2-[(1R)-1-(6,6-dimethylbicyclo[3.1.1]hept-2-en-2-ylmethyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0753]



HPLC retention time (min) : 5.09; MS (m/z) : 819 (2M + H)⁺, 410 (M + H)⁺; HPLC condition : B.

Example 7(312)

2-[1-carboxymethylpiperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0754] HPLC retention time (min) : 2.78; MS (m/z) : 667 (2M + H)⁺, 334 (M + H)⁺; HPLC condition : B.

Example 7(313)

2-(1-cyclopropylmethylpiperidin-4-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0755] HPLC retention time (min) : 3.97; MS (m/z) : 659 (2M + H)⁺, 330 (M + H)⁺; HPLC condition : B.

Example 7(314)

2-[1-(3-methylthiopropyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0756] HPLC retention time (min) : 3.95; MS (m/z) : 364 (M + H)⁺; HPLC condition : B.

Example 7(315)

2-[1-(2,6-dimethyl-5-heptenyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0757] HPLC retention time (min) : 5.03; MS (m/z) : 799 (2M + H)⁺, 400 (M + H)⁺; HPLC condition : B.

Example 7(316)

4-(perhydroazepin-1-yl)-2-[1-(quinolin-2-ylmethyl)piperidin-4-ylamino]pyrimidine

[0758] HPLC retention time (min) : 3.93; MS (m/z) : 833 (2M + H)⁺, 417 (M + H)⁺; HPLC condition : B.

Example 7(317)

2-(1-neopentylpiperidin-4-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0759] HPLC retention time (min) : 4.76; MS (m/z) : 691 (2M + H)⁺, 346 (M + H)⁺; HPLC condition : B.

Example 7(318)

2-[1-[(Z)-4-decenyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0760] HPLC retention time (min) : 5.34; MS (m/z) : 414 (M + H)⁺; HPLC condition : B.

Example 7(319)

4-(perhydroazepin-1-yl)-2-[1-(3-phenylpropyl)piperidin-4-ylamino]pyrimidine

[0761] HPLC retention time (min) : 4.32; MS (m/z) : 787 (2M + H)⁺, 394 (M + H)⁺; HPLC condition : B.

Example 7(320)

2-[1-butylpiperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0762] HPLC retention time (min) : 4.21; MS (m/z) : 332 (M + H)⁺; HPLC condition : B.

Example 7(321)

2-[1-[(E)-3-(4-dimethylaminophenyl)-2-propenyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0763] HPLC retention time (min) : 4.33; MS (m/z) : 869 (2M + H)⁺, 435 (M + H)⁺; HPLC condition : B.

Example 7(322)

2-[1-(3-hydroxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0764] HPLC retention time (min) : 3.44; MS (m/z) : 763 (2M + H)⁺, 382 (M + H)⁺; HPLC condition : B.

Example 7(323)

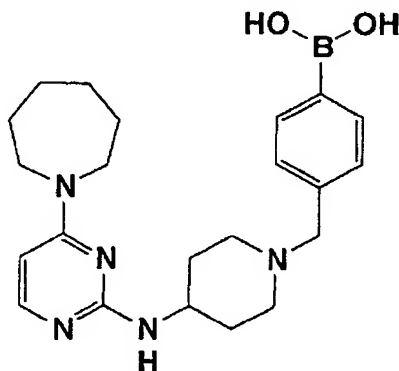
2-[1-(2-hydroxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0765] HPLC retention time (min) : 4.10; MS (m/z) : 763 (2M + H)⁺, 382 (M + H)⁺; HPLC condition : B.

Example 7(324)

2-[1-(4-dihydroxyborylbenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0766]



HPLC retention time (min) : 3.11; MS (m/z) : 410 (M + H)⁺; HPLC condition : B.

Example 7(325)

2-[1-(4-heptyloxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0767] HPLC retention time (min) : 5.31; MS (m/z) : 480 (M + H)⁺; HPLC condition : B.

Example 7(326)

2-[1-(benzo[b]furan-2-ylmethyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0768] HPLC retention time (min) : 4.17; MS (m/z) : 811 (2M + H)⁺, 406 (M + H)⁺; HPLC condition : B.

Example 7(327)

2-[1-(3-methylbenzo[b]thiophen-2-yl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0769] HPLC retention time (min) : 4.54; MS (m/z) : 871 (2M + H)⁺, 436 (M + H)⁺; HPLC condition : B.

Example 7(328)

2-[1-[2-(4-chlorophenylthio)benzyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0770] HPLC retention time (min) : 5.03; MS (m/z) : 510, 508 (M + H)⁺; HPLC condition : B.

Example 7(329)

2-[1-(3,7-dimethyl-6-octenyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0771] HPLC retention time (min) : 5.12; MS (m/z) : 414 (M + H)⁺; HPLC condition : B.

Example 7(330)

4-(perhydroazepin-1-yl)-2-[1-(4-pyrrolidinobenzyl)piperidin-4-ylamino]pyrimidine

[0772] HPLC retention time (min) : 4.57; MS (m/z) : 869 (2M + H)⁺, 435 (M + H)⁺; HPLC condition : B.

Example 7(331)

2-[1-[2-methyl-3-(4-t-butylphenyl)propyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 **[0773]** HPLC retention time (min) : 5.21; MS (m/z): 464 (M+H)⁺; HPLC condition : B.

Example 7(332)

2-[1-(2-benzyloxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 **[0774]** HPLC retention time (min) : 4.44; MS (m/z); 472 (M+H)⁺; HPLC condition : B.

Example 7(333)

15 2-[1-(3,5-di-t-butyl-4-hydroxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0775] HPLC retention time (min) : 4.72; MS (m/z); 494 (M + H)⁺; HPLC condition : B.

Example 7(334)

20 2-[1-[3-(4-isopropylphenyl)-2-methylpropyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0776] HPLC retention time (min) : 5.09; MS (m/z) : 450 (M + H)⁺; HPLC condition : B.

25 Example 7(335)

2-[1-[3,4-bis(benzyloxy)benzyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 **[0777]** HPLC retention time (min) : 4.57; MS (m/z) : 578 (M + H)⁺; HPLC condition : B.

Example 7(336)

2-[1-(4-octyloxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 **[0778]** HPLC retention time (min) : 5.64; MS (m/z) ; 494 (M + H)⁺; HPLC condition : B.

Example 7(337)

4-(perhydroazepin-1-yl)-2-[1-(3,5,5-trimethylhexyl)piperidin-4-ylamino]pyrimidine

40 **[0779]** HPLC retention time (min): 5.16; MS (m/z): 402 (M + H)⁺; HPLC condition : B.

Example 7(338)

45 2-(1-butoxycarbonylmethyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0780] HPLC retention time (min) : 3.99; MS (m/z) ; 779 (2M + H)⁺, 390 (M + H)⁺; HPLC condition : B.

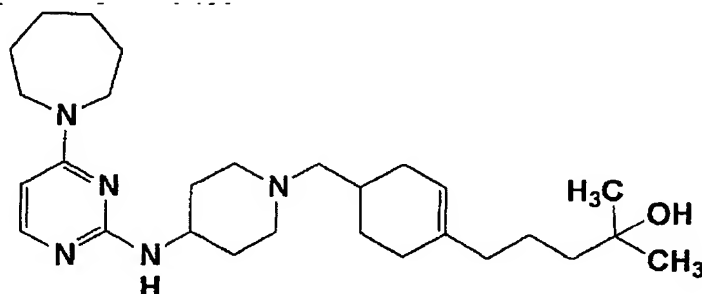
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Example 7(339)

2-[1-[5-(4-hydroxy-4-methylpentyl)-1,2,3,4-tetrahydrobenzen-2-ylmethyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0781]



HPLC retention time (min) : 4.41; MS (m/z) : 470 (M + H)⁺; HPLC condition : B.

Example 7(340)

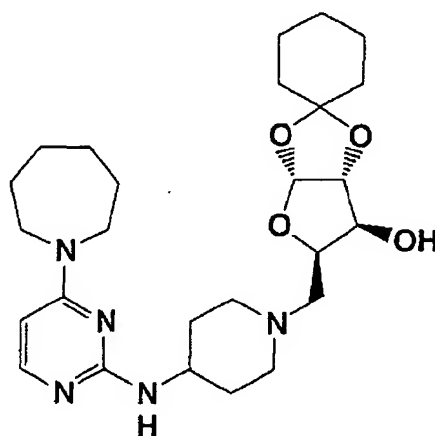
2-[1-(5-hydroxypentyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0782] HPLC retention time (min) : 3.49; MS (m/z) : 723 (2M + H)⁺, 362 (M + H)⁺; HPLC condition : B.

Example 7(341)

2-[1-[(1R,2S,3R,5R)-2-hydroxy-4,6,8-trioxaspiro[bicyclo[3.3.0]octane-7,1'-cyclohexane]-3-ylmethyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0783]



HPLC retention time (min) : 3.80; MS (m/z) : 488 (M + H)⁺; HPLC condition : B.

Example 7(342)

4-(perhydroazepin-1-yl)-2-[1-(3-phenylpyrazol-4-ylmethyl)piperidin-4-ylamino]pyrimidine

[0784] HPLC retention time (min) : 3.77; MS (m/z) : 863 (2M + H)⁺, 432 (M + H)⁺; HPLC condition : B.

Example 7(343)

2-[1-(4-t-butylbenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0785] HPLC retention time (min) : 4.68; MS (m/z) : 843 (2M + H)⁺, 422 (M + H)⁺; HPLC condition : B.

Example 7(344)

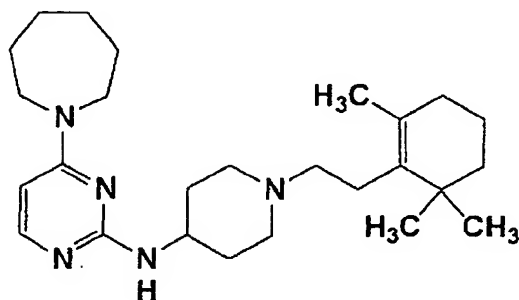
2-[1-(1,4-benzodioxan-6-ylmethyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0786] HPLC retention time (min) : 3.99; MS (m/z) : 847 (2M + H)⁺, 424 (M + H)⁺; HPLC condition: B.

Example 7(345)

4-(perhydroazepin-1-yl)-2-[1-[2-(1,1,5-trimethyl-1,2,3,4-tetrahydrobenzen-6-yl)ethyl]piperidin-4-ylamino]pyrimidine

[0787]



HPLC retention time (min) : 5.18; MS (m/z) : 426 (M + H)⁺; HPLC condition : B.

Example 7(346)

2-[1-[4-(3-dimethylaminopropoxy)benzyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0788] HPLC retention time (min) : 4.22; MS (m/z) : 467 (M + H)⁺; HPLC condition : B.

Example 7(347)

2-[1-(2-furylmethyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0789] HPLC retention time (min) : 3.82; MS (m/z) : 711 (2M + H)⁺, 356 (M + H)⁺; HPLC condition : B.

Example 7(348)

2-(1-isobutylpiperidin-4-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0790] HPLC retention time (min) : 4.30; MS (m/z) : 663 (2M + H)⁺, 332 (M + H)⁺; HPLC condition : B.

Example 7(349)

2-(1-cyclohexylmethylpiperidin-4-ylamino)-4-(perhydroazepin-1-yl)pyrimidine

[0791] HPLC retention time (min) : 4.85; MS (m/z) : 743 (2M + H)⁺, 372 (M + H)⁺; HPLC condition : B.

Example 7(350)

4-(perhydroazepin-1-yl)-2-[1-(2-thiazolylmethyl)piperidin-4-ylamino]pyrimidine

5 [0792] HPLC retention time (min) : 3.64; MS (m/z) : 745 (2M + H)⁺, 373 (M + H)⁺; HPLC condition : B.

Example 7(351)

2-[1-(4-acetylaminobenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10 [0793] HPLC retention time (min) : 3.55; MS (m/z) : 845 (2M + H)⁺, 423 (M + H)⁺; HPLC condition : B.

Example 7(352)

2-[1-(2-methoxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

15 [0794] HPLC retention time (min) : 4.13; MS (m/z) : 791 (2M + H)⁺, 396 (M + H)⁺; HPLC condition : B.

Example 7(353)

2-[1-(4-methoxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

20 [0795] HPLC retention time (min) : 4.06; MS (m/z) : 791 (2M + H)⁺, 396 (M + H)⁺; HPLC condition : B.

Example 7(354)

4-(perhydroazepin-1-yl)-2-[1-(4-phenylbenzyl)piperidin-4-ylamino]pyrimidine

30 [0796] HPLC retention time (min) : 4.54; MS (m/z) : 883 (2M + H)⁺, 442 (M + H)⁺; HPLC condition : B.

Example 7(355)

2-[1-[(2E)-3,7-dimethyl-2,6-octadienyl]piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 [0797] HPLC retention time (min) : 4.89; MS (m/z) : 823 (2M + H)⁺, 412 (M + H)⁺; HPLC condition : B.

Example 7(356)

2-[1-(4-diethylaminobenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

40 [0798] HPLC retention time (min) : 4.57; MS (m/z) : 873 (2M + H)⁺, 437 (M + H)⁺; HPLC condition : B.

Example 7(357)

2-[1-(3-fluorobenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

45 [0799] HPLC retention time (min) : 4.15; MS (m/z) : 767 (2M + H)⁺, 384 (M + H)⁺; HPLC condition : B.

Example 7(358)

2-[1-(1-naphthylmethyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

50 [0800] HPLC retention time (min) : 4.54; MS (m/z) : 831 (2M + H)⁺, 416 (M + H)⁺; HPLC condition : B.

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Example 7(359)

2-[1-(3-nitrobenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 **[0801]** HPLC retention time (min) : 4.04; MS (m/z) : 821 (2M + H)⁺, 411 (M + H)⁺; HPLC condition : B.

Example 7(360)

4-(perhydroazepin-1-yl)-2-(1-propylpiperidin-4-ylamino)pyrimidine

10 **[0802]** HPLC retention time (min) : 4.02; MS (m/z) : 635 (2M + H)⁺, 318 (M + H)⁺; HPLC condition : B.

Example 7(361)

15 4-(perhydroazepin-1-yl)-2-[1-[(2S,3S,4R)-2,3,4,5-tetrahydroxypentyl]piperidin-4-ylamino]pyrimidine

[0803] HPLC retention time (min) : 3.14; MS (m/z) : 410 (M + H)⁺; HPLC condition : B.

Example 7(362)

20 4-(perhydroazepin-1-yl)-2-[1-(2-thienylmethyl)piperidin-4-ylamino]pyrimidine

[0804] HPLC retention time (min) : 4.06; MS (m/z) : 743 (2M + H)⁺, 372 (M + H)⁺; HPLC condition : B.

25 Example 7(363)

2-[1-(4-chlorobenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

30 **[0805]** HPLC retention time (min) : 4.35; MS (m/z) : 799 (2M + H)⁺, 402, 400 (M + H)⁺; HPLC condition : B.

Example 7(364)

2-[1-(1,3-benzodioxol-4-yl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

35 **[0806]** HPLC retention time (min) : 4.02; MS (m/z) : 819 (2M + H)⁺, 410 (M + H)⁺; HPLC condition : B.

Example 7(365)

4-(perhydroazepin-1-yl)-2-[1-[(3S,4R)-3,4,5-trihydroxypentyl]piperidin-4-ylamino]pyrimidine

40 **[0807]** HPLC retention time (min) : 3.18, MS (m/z) : 787 (2M + H)⁺, 394 (M + H)⁺; HPLC condition : B.

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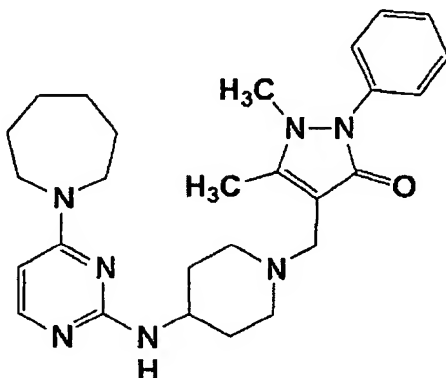
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Example 7(366)

2-[1-(1,5-dimethyl-2-phenyl-3-oxo-2,3-dihydro-1H-pyrazol-4-ylmethyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0808]



HPLC retention time (min) : 3.51; MS (m/z) : 951 (2M + H)⁺, 476 (M + H)⁺; HPLC condition : B.

Example 7(367)

2-[1-(3-methoxy-4-hexyloxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0809] HPLC retention time (min) : 4.72; MS (m/z) : 496 (M + H)⁺; HPLC condition : B.

Example 7(368)

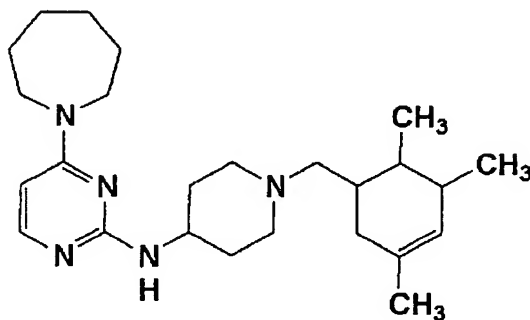
2-[1-(4-fluorobenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0810] HPLC retention time (min) : 4.13; MS (m/z) : 767 (2M + H)⁺, 384 (M + H)⁺; HPLC condition : B.

Example 7(369)

4-(perhydroazepin-1-yl)-2-[1-(1,2,5-trimethyl-1,2,3,4-tetrahydrobenzen-3-ylmethyl)piperidin-4-ylamino]pyrimidine

[0811]



HPLC retention time (min) : 5.18; MS (m/z) : 823 (2M + H)⁺, 412 (M + H)⁺; HPLC condition : B.

Example 7(370)

2-[1-(3,5-dimethyl-1-phenylpyrazol-4-ylmethyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

5 [0812] HPLC retention time (min) : 4.02; MS (m/z) : 919 (2M + H)⁺, 460 (M + H)⁺; HPLC condition : B.

Example 7(371)

2-[1-(2-benzyloxyethyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

10

[0813] HPLC retention time (min) : 4.06; MS (m/z) : 410 (M + H)⁺; HPLC condition : B.

Example 7(372)

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2-[1-(4-benzyloxy-3-methoxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0814] HPLC retention time (min) : 4.30; MS (m/z) : 502 (M + H)⁺; HPLC condition : B.

Example 7(373)

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2-[1-(3-benzyloxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0815] HPLC retention time (min) : 4.44; MS (m/z) : 943 (2M + H)⁺, 472 (M + H)⁺; HPLC condition : B.

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Example 7(374)

2-[1-(4-benzyloxybenzyl)piperidin-4-ylamino]-4-(perhydroazepin-1-yl)pyrimidine

[0816] HPLC retention time (min) : 4.44; MS (m/z) : 943 (2M + H)⁺, 472 (M + H)⁺; HPLC condition : B.

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Example 7(375)

4-(perhydroazepin-1-yl)-2-[1-(4-phenoxybenzyl)piperidin-4-ylamino]pyrimidine

35

[0817] HPLC retention time (min) : 4.51; MS (m/z) : 915 (2M + H)⁺, 458 (M + H)⁺; HPLC condition : B.

Example 8

4-(perhydroazepin-1-yl)-2-[(1-benzyl)azetidin-3-ylamino]pyrimidine

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[0818] By the same procedure as described in Example 4 using the compound prepared in Reference Example 1 and 1-benzyl-3-aminoazetidine, the compound of the present invention having the following physical data was given.

TLC : Rf 0.40 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);

MS (m/z) : 338 (M + H)⁺, 248, 190;

45

HPLC retention time (min) : 3.01; HPLC condition : A.

Example 8(1) to Example 8(2)

[0819] By the same procedure as described in Example 8 using the compound prepared in Reference Example 1 and corresponding amine compounds, the compounds of the present invention having the following physical data were given.

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Example 8(1)

55

4-(perhydroazepin-1-yl)-2-[(3S)-(1-benzyl)piperidin-3-ylamino]pyrimidine

[0820] TLC : Rf 0.50 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);

NMR (DMSO-d₆, 323K) : δ 1.33 (m, 1H), 1.45 (m, 4H), 1.51 (m, 1H), 1.65 (m, 5H), 1.76 (m, 1H), 1.90 (m, 1H), 2.04

(m, 1H), 2.60 (m, 1H), 2.85 (m, 1H), 3.28 (m, 2H), 3.49 (m, 4H), 3.84 (m, 1H), 5.83 (d, J = 6.0 Hz, 1H), 5.94 (m, 1H), 7.23 (m, 1H), 7.29 (m, 4H), 7.70 (d, J = 6.0 Hz, 1H);
 MS (m/z) : 366 (M + H)⁺, 276;
 HPLC retention time (min) : 3.03; HPLC condition : A.

5

Example 8(2)

4-(perhydroazepin-1-yl)-2-[(3S)-(1-benzyl)perhydroazepin-3-ylamino]pyrimidine

10 **[0821]** TLC : Rf 0.45 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO-d₆) : δ 1.41 (m, 5H), 1.64 (m, 9H), 2.56 (m, 3H), 2.81 (m, 1H), 3.49 (m, 4H), 3.63 (s, 2H), 3.97 (m, 1H), 5.80 (d, J = 6.0 Hz, 1H), 6.06 (m, 1H), 7.24 (m, 5H), 7.68 (d, J = 6.0 Hz, 1H);
 MS (m/z) : 380 (M + H)⁺, 290;
 HPLC retention time (min) : 3.03; HPLC condition: A.

15

Example 9

4-(perhydroazepin-1-yl)-2-(azetidin-3-ylamino)pyrimidine

20 **[0822]** By the same procedure as described in Example 5 using the compound prepared in Example 8, the compound of the present invention having the following physical data was given.
 TLC : Rf 0.65 (chloroform : methanol : 28% ammonia water = 80 : 20 : 4);
 NMR (CDCl₃) : δ 1.52 (m, 4H), 1.73 (m, 4H), 3.54 (m, 4H), 3.61 (m, 2H), 3.89 (m, 2H), 4.85 (m, 1H), 5.41 (m, 1H), 5.80 (d, J = 6.0 Hz, 1H), 7.77 (d, J = 6.0 Hz, 1H);
 25 MS (m/z) : 248 (M + H)⁺, 124.5 (M + 2H)²⁺;
 HPLC retention time (min) : 2.81; HPLC condition : A.

Example 9(1) to Example 9(3)

30 **[0823]** By the same procedure as described in Example 9 using corresponding benzylamine derivatives, the compounds of the present invention having the following physical data were given.

Example 9(1)

35 4-(perhydroazepin-1-yl)-2-[(3S)-piperidin-3-ylamino]pyrimidine

[0824] TLC : Rf 0.70 (chloroform : methanol : 28% ammonia water = 80 : 20 : 4);
 NMR (DMSO-d₆) : δ 1.43 (m, 6H), 1.62 (m, 5H), 1.82 (m, 1H), 2.34 (m, 2H), 2.73 (m, 1H), 3.00 (m, 1H), 3.45 (m, 4H), 3.75 (m, 1H), 5.82 (d, J = 6.0 Hz, 1H), 6.21 (m, 1H), 7.70 (d, J = 6.0 Hz, 1H);
 40 MS (m/z) : 276 (M + H)⁺, 138.5 (M + 2H)²⁺;
 HPLC retention time (min) : 2.85; HPLC condition : A.

Example 9(2)

45 4-(perhydroazepin-1-yl)-2-[(3S)-perhydroazepin-3-ylamino]pyrimidine

[0825] TLC : Rf 0.33 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO-d₆) : δ 1.34 (m, 5H), 1.70 (m, 9H), 2.60 (dd, J = 13.5, 7.0 Hz, 1H), 2.72 (t, J = 5.5 Hz, 2H), 2.90 (dd, J = 13.5, 4.0 Hz, 1H), 3.57 (m, 4H), 3.90 (m, 1H), 5.81 (d, J = 6.0 Hz, 1H), 6.10 (m, 1H), 7.70 (d, J = 6.0 Hz, 1H);
 50 MS (m/z) : 290 (M + H)⁺, 145.5 (M + 2H)²⁺;
 HPLC retention time (min) : 2.92; HPLC condition : A.

Example 9(3)

55 4-(perhydroazepin-1-yl)-2-[(3S)-perhydroazepin-3-ylamino]-5,6,7,8-tetrahydroquinazoline

[0826] TLC : Rf 0.32 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO-d₆) : δ 1.43 (m, 6H), 1.56 (m, 5H), 1.73 (m, 7H), 2.43 (m, 4H), 2.57 (m, 1H), 2.71 (t, J = 6.0 Hz, 2H), 2.87

(m, 1H), 3.50 (t, J = 6.0 Hz, 4H), 3.85 (m, 1H), 5.85 (m, 1H); MS (m/z) : 344(M + H)⁺, 172.5 (M + 2H)²⁺;
HPLC retention time (min) : 3.09; HPLC condition : A.

Example 10

4-(perhydroazepin-1-yl)-2-[(1-isobutyl)azetidin-3-ylamino]pyrimidine

[0827] By the same procedure as described in Example 7 using the compound prepared in Example 9 and isobutyraldehyde, the compound of the present invention having the following physical data was given.

TLC : R_f 0.40 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);

NMR (DMSO-d₆, 323K) : δ 0.84 (d, J = 7.0 Hz, 6H), 1.47 (m, 4H), 1.52 (m, 1H), 1.69 (m, 4H), 2.19 (d, J = 7.0 Hz, 2H), 2.80 (t, J = 7.0 Hz, 2H), 3.54 (m, 6H), 4.33 (m, 1H), 5.87 (d, J = 6.0 Hz, 1H), 6.62 (m, 1H), 7.73 (d, J = 6.0 Hz, 1H);

MS (m/z) : 304 (M + H)⁺, 248, 152.5 (M + 2H)²⁺;

HPLC retention time (min) : 2.96; HPLC condition : A.

Example 10(1) to Example 10(12)

[0828] By the same procedure as described in Example 10 using corresponding amine compounds and corresponding aldehyde compounds, the compounds of the present invention having the following physical data were given.

Example 10(1)

4-(perhydroazepin-1-yl)-2-[1-(2-ethylbutyl)azetidin-3-ylamino]pyrimidine

[0829] TLC : R_f 0.40 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);

NMR (DMSO-d₆, 323K) : δ 0.82 (t, J = 7.5 Hz, 6H), 1.15 (m, 1H), 1.25 (m, 2H), 1.30 (m, 2H), 1.48 (m, 4H), 1.69 (m, 4H), 2.27 (d, J = 6.5 Hz, 2H), 2.79 (t, J = 7.0 Hz, 2H), 3.53 (m, 6H), 4.32 (m, 1H), 5.87 (d, J = 6.0 Hz, 1H), 6.62 (m, 1H), 7.73 (d, J = 6.0 Hz, 1H);

MS (m/z) : 332 (M + H)⁺, 248, 166.5 (M + 2H)²⁺;

HPLC retention time (min) : 3.09; HPLC condition : A.

Example 10(2)

4-(perhydroazepin-1-yl)-2-[(1-cyclohexyl)azetidin-3-ylamino]pyrimidine

[0830] TLC : R_f 0.40 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);

MS (m/z) : 330 (M + H)⁺, 248, 165.5 (M + 2H)²⁺;

HPLC retention time (min) : 3.03; HPLC condition : A.

Example 10(3)

4-(perhydroazepin-1-yl)-2-[1-(2-pyridinylmethyl)azetidin-3-ylamino]pyrimidine

[0831] TLC : R_f 0.33 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);

MS (m/z) : 339 (M + H)⁺, 170 (M + 2H)²⁺;

HPLC retention time (min) : 2.94; HPLC condition : A.

Example 10(4)

4-(perhydroazepin-1-yl)-2-[(3S)-(1-isobutyl)piperidin-3-ylamino]pyrimidine

[0832] TLC : R_f 0.50 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);

NMR (DMSO-d₆, 323K) : δ 0.85 (d, J = 6.5 Hz, 3H), 0.87 (d, J = 6.5 Hz, 3H), 1.33 (m, 1H), 1.48 (m, 5H), 1.69 (m, 7H), 1.88 (m, 1H), 2.05 (m, 3H), 2.57 (m, 1H), 2.88 (m, 1H), 3.55 (m, 4H), 3.83 (m, 1H), 5.87 (d, J = 6.0 Hz, 1H), 5.97 (m, 1H), 7.73 (d, J = 6.0 Hz, 1H);

MS (m/z) : 332 (M + H)⁺, 276, 166.5 (M + 2H)²⁺;

HPLC retention time (min) : 2.98; HPLC condition : A.

Example 10(5)

4-(perhydroazepin-1-yl)-2-[(3S)-1-(2-ethylbutyl)piperidin-3-ylamino]pyrimidine oil;

- 5 **[0833]** TLC : Rf 0.60 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (CDCl₃) : δ 0.84(t, J = 7.5 Hz, 6H), 1.31(m, 5H), 1.54(m, 5H), 1.75(m, 5H), 1.88(m, 2H), 2.10(d, J = 7.0 Hz, 2H),
 2.31(m, 3H), 2.65(m, 1H), 3.56(m, 4H), 4.02(m, 1H), 5.17(m, 1H), 5.76(d, J = 6.0 Hz, 1H), 7.80(d, J = 6.0 Hz, 1H).
 MS (m/z) : 360 (M + H)⁺, 276, 180.5 (M + 2H)²⁺;
 HPLC retention time (min) : 3.11; HPLC condition : A.

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Example 10(6)

4-(perhydroazepin-1-yl)-2-[(3S)-1-(2-pyridinylmethyl)piperidin-3-ylamino]pyrimidine

- 15 **[0834]** TLC : Rf 0.35 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);
 NMR (DMSO-d₆, 323K) : δ 1.34 (m, 1H), 1.45 (m, 4H), 1.54 (m, 1H), 1.65 (m, 5H), 1.77 (m, 1H), 1.99 (m, 1H), 2.13
 (m, 1H), 2.65 (m, 1H), 2.89 (m, 1H), 3.50 (m, 4H), 3.55 (d, J = 13.5 Hz, 1H), 3.63 (d, J = 13.5 Hz, 1H), 3.86 (m, 1H),
 5.84 (d, J = 6.0 Hz, 1H), 5.99 (m, 1H), 7.23 (m, 1H), 7.44 (d, J = 8.0 Hz, 1H), 7.71 (d, J = 6.0 Hz, 1H), 7.74 (dd, J =
 8.0, 2.0 Hz, 1H), 8.47 (m, 1H);
 20 MS (m/z) : 367 (M + H)⁺, 184 (M + 2H)²⁺;
 HPLC retention time (min) : 2.92; HPLC condition : A.

Example 10(7)

- 25 4-(perhydroazepin-1-yl)-2-[(3S)-1-(1-cyclohexyl)piperidin-3-ylamino]pyrimidine

[0835] oil;
 TLC : Rf 0.48 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (CDCl₃) : δ 1.06(m, 1H), 1.22(m, 4H), 1.55(m, 5H), 1.76(m, 12H), 2.28(m, 2H), 2.45(m, 1H), 2.56(m, 1H), 2.95
 30 (m, 1H), 3.57(m, 4H), 3.98(m, 1H), 5.06(m, 1H), 5.75(d, J = 6.0 Hz, 1H), 7.79(d, J = 6.0 Hz, 1H).
 MS (m/z) : 358 (M + H)⁺, 276, 179.5 (M + 2H)²⁺;
 HPLC retention time (min) : 2.94; HPLC condition : A.

Example 10(8)

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4-(perhydroazepin-1-yl)-2-[(3S)-1-(tetrahydro-2H-pyran-4-yl)piperidin-3-ylamino]pyrimidine

[0836] oil;
 TLC : Rf 0.45 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 40 NMR (CDCl₃) : δ 1.55(m, 8H), 1.75(m, 8H), 1.91(m, 1H), 2.28(m, 1H), 2.45(m, 2H), 2.58 (m, 1H), 2.96(m, 1H), 3.36
 (m, 2H), 3.57(m, 4H), 4.01(m, 2H), 5.11(m, 1H), 5.77(d, J = 6.0 Hz, 1H), 7.79(d, J = 6.0 Hz, 1H),
 MS (m/z) : 719 (2M + H)⁺, 360 (M + H)⁺, 276;
 HPLC retention time (min) : 2.78; HPLC condition : A.

- 45 Example 10(9)

4-(perhydroazepin-1-yl)-2-[(3S)-1-(1-isobutyl)perhydroazepin-3-ylamino]pyrimidine

- [0837]** TLC : Rf 0.50 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);
 50 NMR (DMSO-d₆, 323K) : δ 0.87 (d, J = 6.5 Hz, 3H), 0.88 (d, J = 6.5 Hz, 3H), 1.48 (m, 4H), 1.62 (m, 5H), 1.68 (m, 4H),
 1.76 (m, 2H), 2.21 (dd, J = 12.0, 7.5 Hz, 1H), 2.26 (dd, J = 12.0, 7.0 Hz, 1H), 2.60 (m, 3H), 2.77 (dd, J = 13.5, 4.0 Hz,
 1H), 3.55 (m, 4H), 3.94 (m, 1H), 5.84 (d, J = 6.0 Hz, 1H), 5.87 (m, 1H), 7.72 (d, J = 6.0 Hz, 1H);
 MS (m/z) : 346 (M + H)⁺, 290, 173.5 (M + 2H)²⁺;
 HPLC retention time (min) : 3.00; HPLC condition : A.

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Example 10(10)

4-(perhydroazepin-1-yl)-2-[(3S)-1-(2-ethylbutyl)perhydroazepin-3-ylamino]pyrimidine

- 5 **[0838]** TLC : Rf 0.60 (chloroform : methanol : 28% ammonia water = 80 : 10 : 1);
 NMR (DMSO- d_6 , 323K) : δ 0.83 (t, J = 7.5 Hz, 3H), 0.85 (t, J = 7.5 Hz, 3H), 1.30 (m, 6H), 1.48 (m, 4H), 1.62 (m, 3H),
 1.69 (m, 4H), 1.75 (m, 2H), 2.29 (m, 2H), 2.58 (m, 3H), 2.76 (dd, J = 13.5, 4.0 Hz, 1H), 3.55 (m, 4H), 3.95 (m, 1H),
 5.84 (m, 2H), 7.72 (d, J = 6.0 Hz, 1H);
 MS (m/z) : 374 (M + H)⁺, 290, 187.5 (M + 2H)²⁺;
 10 HPLC retention time (min) : 3.12; HPLC condition : A.
 Example 10(11)

4-(perhydroazepin-1-yl)-2-[(3S)-(1-cyclohexyl)pyrrolidin-3-ylamino]pyrimidine

- 15 **[0839]** oil;
 TLC : Rf 0.35 (ethyl acetate : methanol : triethylamine = 20 : 2 : 1);
 NMR (DMSO- d_6) : δ 1.15(m, 6H), 1.44(m, 6H), 1.66(m, 7H), 1.78(m, 1H), 2.01(m, 2H), 2.34(dd, J = 9.0, 5.5 Hz, 1H),
 2.55(m, 1H), 2.87(t, J = 8.5 Hz, 1H), 3.52 (m, 4H), 4.17(m, 1H), 5.83(d, J = 6.0 Hz, 1H), 6.38(m, 1H), 7.71(d, J = 6.0
 Hz, 1H);
 20 MS (m/z) : 344 (M + H)⁺, 262, 182;
 HPLC retention time (min) : 3.05; HPLC condition : A.

Example 11-0001 to Example 11-1035

- 25 **[0840]** By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds,
 the compounds of the present invention having the following physical data were given.

Example 11-0001

- 30 N¹-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]-N³,N³-dimethylpropane-1,3-diamine

- [0841]** NMR (DMSO- d_6) : δ 1.63 (m, 2H), 2.11 (s, 6H), 2.23 (t, J = 7.0 Hz, 2H), 2.83 (t, J = 6.0 Hz, 2H), 3.23 (q, J =
 6.5 Hz, 2H), 3.76 (t, J = 6.0 Hz, 2H), 4.66 (s, 2H), 6.04 (d, J = 6.0 Hz, 1H), 6.53 (m, 1H), 7.19 (m, 4H), 7.80 (d, J = 6.0
 Hz, 1H);
 35 MS (ESI, Pos. 20 V) : 312 (M + H)⁺, 278, 156;
 TLC : Rf 0.19 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0002

- 40 N¹-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]-N²,N²-dimethylethane-1,2-diamine

- [0842]** NMR (DMSO- d_6) : δ 2.16 (s, 6H), 2.36 (t, J = 6.9 Hz, 2H), 2.84 (t, J = 5.7 Hz, 2H), 3.32 (m, 2H), 3.76 (t, J =
 5.7 Hz, 2H), 4.67 (s, 2H), 6.06 (d, J = 6.0 Hz, 1H), 6.28 (m, 1H), 7.17 (m, 4 H) 7.80 (d, J = 6.0 Hz, 1H);
 MS (ESI, Pos. 20 V) : 298 (M + H)⁺, 149;
 45 TLC : Rf 0.34 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0003

N-2-[(4-azepan-1-yl)pyrimidin-2-yl]amino]ethylacetamide

- 50 **[0843]** NMR (DMSO- d_6 , 373.1K) : δ 1.51 (m, 4H), 1.70 (m, 4H), 1.80 (s, 3H), 3.22 (m, 2H), 3.32 (m, 2H), 3.56 (t, J
 = 6.0 Hz, 4H), 5.85 (d, J = 6.0 Hz, 1H), 5.97 (m, 1H), 7.52 (m, 1H), 7.73 (d, J = 6.0 Hz, 1H);
 MS (ESI, Pos. 20 V) : 278 (M + H)⁺;
 TLC : Rf 0.44 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).
 55

Example 11-0004

(1R*,2R*)-N-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]cyclohexane-1,2-diamine

- 5 **[0844]** NMR (DMSO- d_6) : δ 1.15 (m, 4H), 1.66 (m, 2H), 1.82 (m, 1H), 1.97 (m, 1H), 2.84 (t, J = 6.0 Hz, 2H), 3.37 (m, 2H), 3.76 (t, J = 6.0 Hz, 2H), 4.67 (s, 2H), 6.05 (d, J = 6.0 Hz, 1H), 6.35 (m, 1H), 7.17 (m, 4H), 7.80 (d, J = 6.0 Hz, 1H);
MS (MALDI-TOF, Pos.) : 324 (M + H)⁺;
TLC : Rf 0.41 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10 Example 11-0005

(1S*,2R*)-N-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]cyclohexane-1,2-diamine

- 15 **[0845]** NMR (DMSO- d_6) : δ 1.27 (m, 2H), 1.51 (m, 6H), 2.83 (t, J = 6.0 Hz, 2H), 2.98 (m, 1H), 3.77 (m, 3H), 4.66 (s, 2H), 6.04 (m, 2H), 7.18 (m, 4H), 7.80 (d, J = 6.0 Hz, 1H);
MS (MALDI-TOF, Pos.) : 324 (M + H)⁺;
TLC : Rf 0.36 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

20 Example 11-0006

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepane-2-one

- 25 **[0846]** NMR (DMSO- d_6 , 373K) : δ 1.32 (m, 2H), 1.49 (m, 4H), 1.72 (m, 6H), 1.92 (m, 1H), 2.08 (m, 1H), 3.18 (m, 2H), 3.57 (m, 4H), 4.44 (m, 1H), 5.88 (m, 2H), 7.47 (m, 1H), 7.76 (d, J = 6.0 Hz, 1H);
MS (ESI, Pos. 20 V) : 607 (2M + H)⁺, 304 (M + H)⁺;
TLC : Rf 0.50 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0007

30 (3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1,3'-bipiperidin-3-amine

- [0847]** NMR (DMSO- d_6) : δ 1.25 (m, 3H), 1.44 (m, 5H), 1.68 (m, 8H), 2.02 (m, 1H), 2.38 (m, 4H), 2.65 (m, 1H), 2.81 (d, J = 12.30 Hz, 1H), 2.98 (m, 2H), 3.52 (m, 4H), 3.77 (m, 2H), 5.83 (d, J = 6.0 Hz, 1H), 6.10 (m, 1H), 7.70 (d, J = 6.0 Hz, 1H);
35 MS (ESI, Pos. 20 V) : 359 (M + H)⁺, 276;
TLC : Rf 0.21 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0008

40 (3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1,4'-bipiperidin-3-amine

- [0848]** NMR (DMSO- d_6) : δ 1.29 (m, 3H), 1.46 (m, 5H), 1.70 (m, 8H), 1.95 (m, 1H), 2.16 (m, 1H), 2.30 (m, 1H), 2.42 (m, 2H), 2.64 (m, 1H), 2.97 (m, 3H), 3.52 (m, 4H), 3.78 (m, 2H), 5.83 (d, J = 6.0 Hz, 1H), 6.12 (m, 1H), 7.70 (d, J = 6.0 Hz, 1H);
45 MS (ESI, Pos. 20 V) : 359 (M + H)⁺, 276, 180 (M + 2H)²⁺;
TLC : Rf 0.18 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0009

50 2-[4-((1S*,2S*)-2-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]aminocyclohexyl)piperazin-1-yl]ethanol

- [0849]** NMR (DMSO- d_6) : δ 1.22 (m, 4H), 1.74 (m, 4H), 2.26 (m, 6H), 2.40 (m, 2H), 2.66 (m, 2H), 3.05 (m, 2H), 3.35 (m, 2H), 3.84 (m, 3H), 4.32 (m, 1H), 4.76 (s, 2H), 6.23 (m, 1H), 7.07 (t, J = 7.3 Hz, 1H), 7.19 (m, 4H), 7.32 (d, J = 8.2 Hz, 1H), 7.51 (t, J = 7.30 Hz, 1H), 7.81 (d, J = 8.2 Hz, 1H);
55 MS (ESI, Pos. 20 V) : 487 (M + H)⁺, 244;
TLC : Rf 0.47 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0010

4-azepan-1-yl-N-[(1-ethylpyrrolidin-2-yl)methyl]pyrimidin-2-amine

[0850] NMR (CDCl₃): δ 1.24 (t, J = 7.10 Hz, 3H), 1.54 (m, 4H), 1.75 (m, 4H), 1.80 (m, 2H), 2.01 (m, 2H), 2.50 (m, 2H), 3.07 (m, 1H), 3.56 (m, 8H), 5.83 (d, J = 6.30 Hz, 1H), 6.16 (m, 1H), 7.72 (d, J = 6.30 Hz, 1H);
 MS (ESI, Pos. 20 V) : 304 (M + H)⁺;
 TLC : Rf 0.33 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0011

N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²,N²-diisopropylethane-1,2-diamine

[0851] NMR (CDCl₃): δ 1.10 (d, J = 6.6 Hz, 12H), 1.53 (m, 4H), 1.74 (m, 4H), 2.75 (t, J = 6.3 Hz, 2H), 3.14 (m, 2H), 3.46 (m, 2H), 3.57 (m, 4H), 5.79 (d, J = 6.3 Hz, 1H), 5.90 (m, 1H), 7.73 (d, J = 6.3 Hz, 1H);
 MS (ESI, Pos. 20 V) : 320 (M + H)⁺;
 TLC : Rf 0.33 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0012

4-azepan-1-yl-N-(3-pyrrolidin-1-ylpropyl)pyrimidin-2-amine

[0852] NMR (CDCl₃): δ 1.52 (m, 4H), 1.74 (m, 4H), 1.83 (m, 4H), 2.60 (m, 6H), 2.92 (m, 2H), 3.42 (t, J = 6.6 Hz, 2H), 3.54 (m, 4H), 5.25 (m, 1H), 5.76 (d, J = 6.3 Hz, 1H), 7.76 (d, J = 6.3 Hz, 1H);
 MS (ESI, Pos. 20 V) : 304 (M + H)⁺;
 TLC : Rf 0.35 (CHCl₃ : MeOH = 9 : 1).

Example 11-0013

4-azepan-1-yl-N-(3-morpholin-4-ylpropyl)pyrimidin-2-amine

[0853] NMR (CDCl₃): δ 1.49 (m, 4H), 1.70 (m, 6H), 2.37 (m, 6H), 3.37 (q, J = 6.60 Hz, 2H), 3.54 (m, 4H), 3.64 (t, J = 4.70 Hz, 4H), 4.82 (m, 1H), 5.77 (d, J = 6.60 Hz, 1H), 7.59 (d, J = 6.60 Hz, 1H);
 MS (ESI, Pos. 20 V) : 320 (M + H)⁺, 233;
 TLC : Rf 0.33 (CHCl₃ : MeOH = 9 : 1).

Example 11-0014

1-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]propyl 2,2,2-trifluoroacetate

[0854] NMR (CDCl₃): δ 1.53 (m, 4H), 1.76 (m, 4H), 1.80 (m, 2H), 1.99 (m, 2H), 2.35 (t, J = 7.90 Hz, 2H), 3.36 (m, 4H), 3.63 (m, 6H), 5.82 (d, J = 6.60 Hz, 1H), 6.39 (m, 1H), 7.65 (d, J = 6.60 Hz, 1H);
 MS (ESI, Pos. 20 V) : 318 (M + H)⁺;
 TLC : Rf 0.50 (CHCl₃ : MeOH = 9 : 1).

Example 11-0015

4-azepan-1-yl-N-[3-(4-methylpiperazin-1-yl)propyl]pyrimidin-2-amine

[0855] NMR (CDCl₃): δ 1.53 (m, 4H), 1.75 (m, 6H), 2.27 (s, 3H), 2.45 (m, 8H), 2.64 (m, 2H), 3.40 (m, 2H), 3.55 (m, 4H), 5.48 (m, 1H), 5.77 (d, J = 6.30 Hz, 1H), 7.76 (d, J = 6.30 Hz, 1H);
 MS (ESI, Pos. 20 V) : 333 (M + H)⁺, 233;
 TLC : Rf 0.25 (CHCl₃ : MeOH = 9 : 1).

Example 11-0016

4-azepan-1-yl-N-[(3S)-1-cyclopentylpiperidin-3-yl]pyrimidin-2-amine

- 5 **[0856]** NMR (CDCl₃) : δ 1.41 (m, 2H), 1.52 (m, 6H), 1.65 (m, 2H), 1.79 (m, 8H), 1.96 (m, 2H), 2.06 (m, 1H), 2.22 (m, 1H), 2.51 (m, 1H), 2.63 (m, 1H), 3.00 (m, 1H), 3.56 (m, 4H), 4.02 (m, 1H), 5.01 (m, 1H), 5.76 (d, J = 6.20 Hz, 1H), 7.78 (d, J = 6.20 Hz, 1H);
MS (ESI, Pos. 20 V) : 344 (M + H)⁺, 247, 172.5 (M + 2H)²⁺;
TLC : Rf 0.60 (AcOEt : MeOH : TEA = 20 : 10 : 1).

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Example 11-0017

N¹-(4-azepan-1-yl)pyrimidin-2-yl)-N²-phenylethane-1,2-diamine

- 15 **[0857]** NMR (CDCl₃) : δ 1.55 (s, 4H), 1.76 (m, 4H), 3.35 (t, J = 5.70 Hz, 2H), 3.60 (m, 4H), 3.64 (q, J = 5.70 Hz, 2H), 4.29 (m, 1H), 5.27 (m, 1H), 5.82 (d, J = 6.30 Hz, 1H), 6.63 (m, 3H), 7.15 (dd, J = 8.50, 7.10 Hz, 2H), 7.79 (d, J = 6.30 Hz, 1H);
MS (ESI, Pos. 20 V) : 312 (M + H)⁺;
TLC : Rf 0.45 (CHCl₃ : MeOH = 9 : 1).

20

Example 11-0018

1-[2-(3-phenylimidazolidin-1-yl)pyrimidin-4-yl]azepane

- 25 **[0858]** NMR (CDCl₃) : δ 1.54 (m, 4H), 1.77 (m, 4H), 3.58 (t, J = 6.80 Hz, 2H), 3.59 (m, 4H), 3.92 (t, J = 6.60 Hz, 2H), 4.87 (s, 2H), 5.85 (d, J = 6.00 Hz, 1H), 6.69 (d, J = 8.50 Hz, 2H), 6.79 (t, J = 7.10 Hz, 1H), 7.27 (dd, J = 8.50, 7.10 Hz, 2H), 7.91 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 324 (M + H)⁺;
TLC : Rf 0.35 (AcOEt : hexane = 1 : 2).

30

Example 11-0019

N-[4-(2,3-dihydro-1H-indol-1-yl)pyrimidin-2-yl]ethane-1,2-diamine dihydrochloride

- 35 **[0859]** NMR (300 MHz, CD₃OD) : δ 8.42 (brd, J = 8.1 Hz, 1H), 7.92 (d, J = 7.2 Hz, 1H), 7.45-7.27 (m, 2H), 7.18 (m, 1H), 6.51 (d, J = 7.2 Hz, 1H), 4.26 (t, J = 8.1 Hz, 2H), 3.94-3.78 (m, 2H), 3.50-3.25 (m, 4H);
MS (FAB, Pos., Glycerin + m-NBA) : 256 (M + H)⁺, 239, 213;
TLC : Rf 0.13 (n-BuOH : AcOH : H₂O = 4 : 2 : 1).

40

Example 11-0020

N-[4-(3,4-dihydroquinolin-1(2H)-yl)pyrimidin-2-yl]ethane-1,2-diamine dihydrochloride

- 45 **[0860]** NMR (300 MHz, CD₃OD) : δ 7.72 (brd, J = 7.2 Hz, 1H), 7.48-7.22 (m, 4H), 6.64 (d, J = 7.2 Hz, 1H), 4.20-4.00 (m, 2H), 3.94-3.70 (m, 2H), 3.36-3.18 (m, 2H), 2.79 (t, J = 6.6 Hz, 2H), 2.12-2.00 (m, 2H);
MS (FAB, Pos., Glycerin + m-NBA) : 270 (M + H)⁺, 253, 227;
TLC : Rf 0.22 (n-BuOH : AcOH : H₂O = 4 : 2 : 1).

50

Example 11-0021

4-azepan-1-yl-N-(pyridin-2-ylmethyl)pyrimidin-2-amine

- 55 **[0861]** NMR (DMSO-d₆) : δ 1.34 (m, 4H), 1.63 (m, 4H), 3.52 (m, 4H), 4.48 (d, J = 5.90 Hz, 2H), 5.86 (d, J = 5.90 Hz, 1H), 6.97 (m, 1H), 7.17 (m, 1H), 7.24 (d, J = 7.70 Hz, 1H), 7.67 (td, J = 7.70, 1.80 Hz, 1H), 7.72 (d, J = 5.90 Hz, 1H), 8.45 (m, 1H);
MS (ESI, Pos. 20 V) : 284 (M + H)⁺;
TLC : Rf 0.53 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0022

N¹-(4-azepan-1-yl)pyrimidin-2-yl)-N²-(pyridin-2-ylmethyl)ethane-1,2-diamine

- 5 **[0862]** NMR (CD₃OD) : δ 1.52 (m, 4H), 1.74 (m, 4H), 2.83 (t, J = 6.20 Hz, 2H), 3.47 (t, J = 6.20 Hz, 2H), 3.53 (m, 4H), 3.90 (s, 2H), 5.91 (d, J = 6.20 Hz, 1H), 7.27 (m, 1H), 7.44 (m, 1H), 7.66 (d, J = 6.20 Hz, 1H), 7.76 (m, 1H), 8.46 (m, 1H);
MS (ESI, Pos. 20 V) : 327 (M + H)⁺;
TLC : R_f 0.50 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10

Example 11-0023

N-2-[(4-azepan-1-yl)pyrimidin-2-yl]amino]ethylguanidine dihydrochloride

- 15 **[0863]** NMR (DMSO-d₆) : δ 1.46 (m, 4H), 1.71 (m, 4H), 3.35 (m, 2H), 3.47 (m, 2H), 3.63 (m, 2H), 3.79 (t, J = 6.00 Hz, 2H), 6.40 (d, J = 7.30 Hz, 1H), 7.34 (m, 4H), 7.83 (d, J = 7.30 Hz, 1H), 7.99 (m, 1H), 8.21 (m, 1H), 12.63 (m, 1H);
MS (ESI, Pos. 20 V) : 555 (2M + H)⁺, 278 (M + H)⁺, 261;
TLC : R_f 0.26 (AcOEt : AcOH : H₂O = 3 : 1 : 1).

20 Example 11-0024

2-[(4-azepan-1-yl)pyrimidin-2-yl]amino]-N,N,N-trimethylethanaminium iodide

- 25 **[0864]** NMR (DMSO-d₆) : δ 1.46 (m, 4H), 1.69 (m, 4H), 3.11 (s, 9H), 3.41 (m, 2H), 3.51 (m, 4H), 3.68 (m, 2H), 5.94 (d, J = 6.00 Hz, 1H), 6.72 (m, 1H), 7.77 (d, J = 6.00 Hz, 1H);
MS (MALDI-TOF, Pos.) : 278 (M⁺), 233, 219;
TLC : R_f 0.10 (AcOEt : AcOH : H₂O = 3 : 1 : 1).

30 Example 11-0025

N-[4-(3,6-dihydropyridin-1(2H)-yl)pyrimidin-2-yl]ethane-1,2-diamine dihydrochloride

- 35 **[0865]** NMR (DMSO-d₆) : δ 2.19 (m, 2H), 2.98 (m, 2H), 3.64 (m, 2H), 3.77 (m, 1H), 3.98 (m, 1H), 4.12 (m, 1H), 4.34 (m, 1H), 5.77 (d, J = 7.30 Hz, 1H), 5.94 (m, 1H), 6.58 (m, 1H), 7.88 (d, J = 7.30 Hz, 1H), 8.40 (m, 4H), 12.64 (m, 1H);
MS (MALDI-TOF, Pos.) : 220 (M + H)⁺;
TLC : R_f 0.49 (CHCl₃ : MeOH : NH₄OH = 80 : 20 : 4).

Example 11-0026

40 N-[4-(1,4'-bipiperidin-1'-yl)pyrimidin-2-yl]ethane-1,2-diamine trihydrochloride

- [0866]** NMR (DMSO-d₆) : δ 1.39 (m, 1H), 1.73 (m, 5H), 1.95 (m, 2H), 2.26 (m, 2H), 2.93 (m, 5H), 3.18 (m, 1H), 3.38 (m, 2H), 3.46 (m, 1H), 3.64 (q, J = 6.00 Hz, 2H), 4.35 (m, 2H), 5.10 (m, 1H), 6.61 (d, J = 7.30 Hz, 1H), 7.90 (d, J = 7.30 Hz, 1H), 8.28 (m, 3H), 11.04 (m, 1H), 12.68 (m, 1H);
45 MS (MALDI-TOF, Pos.) : 305 (M + H)⁺;
TLC : R_f 0.39 (CHCl₃ : MeOH : NH₄OH = 80 : 20 : 4).

Example 11-0027

50 N-(4-piperidin-1-yl)pyrimidin-2-yl)ethane-1,2-diamine

- [0867]** NMR (DMSO-d₆) : δ 1.44 (m, 4H), 1.63 (m, 2H), 2.91 (t, J = 6.00 Hz, 2H), 3.41 (m, 2H), 3.52 (m, 4H), 6.06 (d, J = 5.90 Hz, 1H), 6.59 (m, 1H), 7.80 (m, 3H);
MS (LC-MS, APCI, Pos. 20 V) : 222 (M + H)⁺, 179;
55 TLC : R_f 0.48 (CHCl₃ : MeOH : NH₄OH = 80 : 20 : 4).

Example 11-0028

N¹-(4-azepan-1-yl)pyrimidin-2-yl)-N²-isopropylethane-1,2-diamine

5 **[0868]** NMR (DMSO-d₆) : δ 0.94 (d, J = 6.20 Hz, 6H), 1.42 (m, 4H), 1.67 (m, 4H), 2.62 (m, 2H), 2.68 (m, 1H), 3.24 (m, 2H), 3.62 (m, 4H), 5.83 (d, J = 6.00 Hz, 1H), 6.26 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 555 (2M + H)⁺, 278 (M + H)⁺;
 TLC : R_f 0.53 (CHCl₃ : MeOH : NH₄OH = 80 : 20 : 4).

10 Example 11-0029

4-azepan-1-yl-N-(1-isopropylpyrrolidin-3-yl)pyrimidin-2-amine

15 **[0869]** NMR (DMSO-d₆) : δ 0.98 (m, 6H), 1.45 (m, 5H), 1.62 (m, 5H), 2.05 (m, 1H), 2.30 (m, 2H), 2.54 (m, 1H), 2.84 (t, J = 7.90 Hz, 1H), 3.60 (m, 4H), 4.16 (m, 1H), 5.83 (d, J = 5.90 Hz, 1H), 6.39 (m, 1H), 7.71 (d, J = 5.90 Hz, 1H);
 MS (ESI, Pos. 20 V) : 304 (M + H)⁺, 262;
 TLC : R_f 0.19 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0030

20 4-azepan-1-yl-N-[1-(1-ethylpropyl)pyrrolidin-3-yl]pyrimidin-2-amine

[0870] NMR (DMSO-d₆) : δ 0.80 (m, 6H), 1.33 (m, 4H), 1.47 (m, 5H), 1.64 (m, 4H), 2.03 (m, 2H), 2.30 (dd, J = 9.00, 5.70 Hz, 1H), 2.55 (m, 2H), 2.88 (t, J = 7.90 Hz, 1H), 3.60 (m, 4H), 4.17 (m, 1H), 5.83 (d, J = 6.20 Hz, 1H), 6.39 (m, 1H), 7.71 (d, J = 6.20 Hz, 1H);
 MS (ESI, Pos. 20 V) : 332 (M + H)⁺, 262, 193;
 TLC : R_f 0.26 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0031

30 4-azepan-1-yl-N-(1-cyclohexylpyrrolidin-3-yl)pyrimidin-2-amine

[0871] NMR (DMSO-d₆) : δ 1.15 (m, 5H), 1.47 (m, 5H), 1.60 (m, 7H), 1.79 (m, 2H), 2.02 (m, 2H), 2.32 (dd, J = 9.20, 5.50 Hz, 1H), 2.55 (m, 2H), 2.86 (t, J = 8.10 Hz, 1H), 3.59 (m, 4H), 4.17 (m, 1H), 5.83 (d, J = 6.20 Hz, 1H), 6.38 (m, 1H), 7.71 (d, J = 6.20 Hz, 1H);
 MS (ESI, Pos. 20 V) : 344 (M + H)⁺, 262;
 TLC : R_f 0.26 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0032

40 4-azepan-1-yl-N-[(3R)-1-benzylpyrrolidin-3-yl]pyrimidin-2-amine

[0872] NMR (CDCl₃) : δ 1.53 (m, 4H), 1.73 (m, 5H), 2.31 (m, 1H), 2.49 (m, 2H), 2.70 (m, 1H), 2.90 (m, 1H), 3.55 (m, 4H), 3.63 (s, 2H), 4.45 (m, 1H), 5.44 (m, 1H), 5.79 (d, J = 6.20 Hz, 1H), 7.30 (m, 5H), 7.74 (d, J = 6.20 Hz, 1H);
 MS (ESI, Pos. 20 V) : 352 (M + H)⁺, 262, 192;
 TLC : R_f 0.55 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0033

50 4-azepan-1-yl-N-[(3S)-1-benzylpyrrolidin-3-yl]pyrimidin-2-amine

[0873] oil;
 NMR (CDCl₃) : δ 1.53 (m, 4H), 1.72 (m, 5H), 2.33 (m, 1H), 2.51 (m, 2H), 2.70 (m, 1H), 2.90 (dd, J = 9.50, 6.60 Hz, 1H), 3.58 (m, 4H), 3.63 (s, 2H), 4.46 (m, 1H), 5.37 (m, 1H), 5.79 (d, J = 6.20 Hz, 1H), 7.32 (m, 5H), 7.75 (d, J = 6.20 Hz, 1H);
 MS (ESI, Pos. 20 V) : 352 (M + H)⁺, 262, 192;
 TLC : R_f 0.55 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0034

4-azepan-1-yl-N-[(3S)-1-(pyridin-2-ylmethyl)pyrrolidin-3-yl]pyrimidin-2-amine

- 5 **[0874]** NMR (CDCl₃) : δ 1.54 (m, 4H), 1.74 (m, 5H), 2.33 (m, 1H), 2.59 (m, 2H), 2.78 (m, 1H), 2.96 (m, 1H), 3.57 (m, 4H), 3.76 (d, J = 13.60 Hz, 1H), 3.82 (d, J = 13.60 Hz, 1H), 4.50 (m, 1H), 5.80 (d, J = 6.20 Hz, 1H), 5.81 (m, 1H), 7.15 (m, 1H), 7.43 (d, J = 7.70 Hz, 1H), 7.65 (td, J = 7.70, 1.80 Hz, 1H), 7.72 (d, J = 6.20 Hz, 1H), 8.54 (m, 1H);
MS (ESI, Pos. 20 V) : 353 (M + H)⁺, 177 (M + 2H)²⁺;
TLC : R_f 0.30 (AcOEt : MeOH : TEA = 20 : 2 : 1).

10

Example 11-0035

4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)pyrrolidin-3-yl]pyrimidin-2-amine

- 15 **[0875]** NMR (CDCl₃) : δ 0.86 (t, J = 7.30 Hz, 6H), 1.36 (m, 5H), 1.54 (m, 4H), 1.75 (m, 5H), 2.29 (m, 3H), 2.46 (m, 2H), 2.67 (m, 1H), 2.83 (m, 1H), 3.57 (m, 4H), 4.45 (m, 1H), 5.26 (m, 1H), 5.79 (d, J = 6.20 Hz, 1H), 7.78 (d, J = 6.20 Hz, 1H);
MS (ESI, Pos. 20 V) : 346 (M + H)⁺, 289, 262;
TLC : R_f 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

20

Example 11-0036

4-azepan-1-yl-N-[(3S)-1-(cyclohexylmethyl)pyrrolidin-3-yl]pyrimidin-2-amine

- 25 **[0876]** NMR (CDCl₃) : δ 0.88 (m, 2H), 1.20 (m, 4H), 1.45 (m, 1H), 1.54 (m, 4H), 1.75 (m, 9H), 2.27 (m, 3H), 2.47 (m, 2H), 2.68 (m, 1H), 2.87 (m, 1H), 3.58 (m, 4H), 4.46 (m, 1H), 5.28 (m, 1H), 5.80 (d, J = 6.20 Hz, 1H), 7.77 (d, J = 6.20 Hz, 1H);
MS (ESI, Pos. 20 V) : 358 (M + H)⁺, 262;
TLC : R_f 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

30

Example 11-0037

4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)pyrrolidin-3-yl]pyrimidin-2-amine

- 35 **[0877]** NMR (DMSO-d₆) : δ 0.81 (m, 6H), 1.26 (m, 6H), 1.45 (m, 4H), 1.63 (m, 4H), 2.07 (m, 1H), 2.21 (m, 3H), 2.43 (m, 2H), 2.79 (m, 1H), 3.43 (m, 4H), 4.19 (m, 1H), 5.84 (d, J = 5.90 Hz, 1H), 6.40 (m, 1H), 7.71 (d, J = 5.90 Hz, 1H);
MS (ESI, Pos. 20 V) : 346 (M + H)⁺, 262, 173.5 (M + 2H)⁺;
TLC : R_f 0.28 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

40

Example 11-0038

4-azepan-1-yl-N-[(3R)-1-(cyclohexylmethyl)pyrrolidin-3-yl]pyrimidin-2-amine

- 45 **[0878]** NMR (DMSO-d₆) : δ 0.82 (m, 2H), 1.14 (m, 3H), 1.35 (m, 1H), 1.43 (m, 4H), 1.65 (m, 10H), 2.05 (m, 1H), 2.15 (m, 2H), 2.24 (m, 1H), 2.40 (m, 2H), 2.74 (m, 1H), 3.52 (m, 4H), 4.19 (m, 1H), 5.84 (d, J = 5.90 Hz, 1H), 6.45 (m, 1H), 7.71 (d, J = 5.90 Hz, 1H);
MS (ESI, Pos. 20 V) : 358 (M + H)⁺, 179.5 (M + 2H)⁺;
TLC : R_f 0.37 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

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Example 11-0040

4-azepan-1-yl-N-(1-tetrahydro-2H-pyran-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

- 55 **[0879]** NMR (DMSO-d₆) : δ 1.28 (m, 2H), 1.47 (m, 4H), 1.69 (m, 6H), 2.07 (m, 2H), 2.33 (m, 1H), 2.61 (m, 1H), 2.86 (m, 1H), 3.31 (m, 4H), 3.39 (m, 4H), 3.84 (m, 2H), 4.21 (m, 1H), 5.84 (d, J = 5.90 Hz, 1H), 6.39 (m, 1H), 7.71 (d, J = 5.90 Hz, 1H);
MS (ESI, Pos. 20 V) : 346 (M + H)⁺, 290;
TLC : R_f 0.44 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0041

4-azepan-1-yl-N-[(3R)-1-cyclohexylpyrrolidin-3-yl]pyrimidin-2-amine

5 **[0880]** NMR (DMSO- d_6): δ 1.16 (m, 5H), 1.50 (m, 5H), 1.67 (m, 7H), 1.83 (m, 2H), 2.07 (m, 3H), 2.70 (m, 2H), 2.98 (m, 1H), 3.63 (m, 4H), 4.22 (m, 1H), 5.86 (d, $J = 5.90$ Hz, 1H), 6.43 (m, 1H), 7.72 (d, $J = 5.90$ Hz, 1H);
 MS (ESI, Pos. 20 V) : 344 (M + H)⁺, 262;
 TLC : Rf 0.39 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10 Example 11-0042

4-azepan-1-yl-N-[(3S)-pyrrolidin-3-yl]pyrimidin-2-amine

15 **[0881]** NMR (DMSO- d_6) : δ 1.42 (m, 4H), 1.67 (m, 5H), 1.93 (m, 1H), 2.66 (dd, $J = 11.10, 4.50$ Hz, 1H), 2.76 (m, 1H), 2.94 (m, 2H), 3.81 (m, 4H), 4.23 (m, 1H), 5.85 (d, $J = 6.00$ Hz, 1H), 6.48 (m, 1H), 7.72 (d, $J = 6.00$ Hz, 1H);
 MS (ESI, Pos. 20 V) : 262 (M + H)⁺, 131.5 (M + 2H)²⁺;
 TLC : Rf 0.20 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0043

20

(3 S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1-cyclohexylazepan-3-amine

[0882] NMR (DMSO- d_6): δ 1.18 (m, 4H), 1.40 (m, 5H), 1.56 (m, 5H), 1.72 (m, 8H), 2.33 (m, 2H), 2.69 (m, 5H), 3.57 (m, 4H), 3.86 (m, 1H), 5.81 (d, $J = 6.20$ Hz, 1H), 5.95 (m, 1H), 7.70 (d, $J = 6.20$ Hz, 1H);
 25 MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 290, 186.5 (M + 2H)²⁺;
 TLC : Rf 0.47 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0044

30 (3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1-tetrahydro-2H-pyran-4-ylazepan-3-amine

[0883] NMR (DMSO- d_6) : δ 1.37 (m, 7H), 1.68 (m, 11H), 2.70 (m, 5H), 3.17 (m, 2H), 3.55 (m, 4H), 3.85 (m, 3H), 5.82 (d, $J = 6.00$ Hz, 1H), 6.01 (m, 1H), 7.70 (d, $J = 6.00$ Hz, 1H);
 MS (ESI, Pos. 20 V) : 374 (M + H)⁺, 316, 290, 187.5 (M + 2H)²⁺;
 35 TLC : Rf 0.50 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0045

40 4-azepan-1-yl-N-cycloheptylpyrimidin-2-amine

[0884] NMR (DMSO- d_6) : δ 1.46 (m, 12H), 1.69 (m, 6H), 1.85 (m, 2H), 3.52 (m, 4H), 3.77 (m, 1H), 5.80 (d, $J = 6.00$ Hz, 1H), 6.26 (m, 1H), 7.70 (d, $J = 6.00$ Hz, 1H);
 MS (ESI, Pos. 20 V) : 577 (2M + H)⁺, 289 (M + H)⁺;
 45 TLC : Rf 0.41 (CHCl₃ : MeOH = 10 : 1).

Example 11-0046

(3 S)-1'-acetyl-N-(4-azepan-1-ylpyrimidin-2-yl)-1,3'-bipiperidin-3-amine

50 **[0885]** NMR (DMSO- d_6) : δ 1.30 (m, 8H), 1.71 (m, 8H), 1.94 (m, 3H), 2.04 (m, 1H), 2.24 (m, 2H), 2.48 (m, 1H), 2.69 (m, 1H), 2.96 (m, 2H), 3.48 (m, 4H), 3.76 (m, 2H), 4.33 (m, 1H), 5.84 (d, $J = 6.00$ Hz, 1H), 6.19 (m, 1H), 7.71 (d, $J = 6.00$ Hz, 1H);
 MS (ESI, Pos. 20 V) : 401 (M + H)⁺, 276, 201 (M + 2H)²⁺;
 55 TLC : Rf 0.52 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0047

(3S)-1'-acetyl-N-(4-azepan-1-ylpyrimidin-2-yl)-1,4'-bipiperidin-3-amine

- 5 **[0886]** NMR (DMSO- d_6) : δ 1.22 (m, 3H), 1.46 (m, 5H), 1.71 (m, 8H), 1.95 (s, 3H), 2.02 (m, 1H), 2.21 (m, 1H), 2.42 (m, 2H), 2.66 (m, 1H), 2.96 (m, 2H), 3.52 (m, 4H), 3.80 (m, 2H), 4.38 (m, 1H), 5.83 (d, J = 6.00 Hz, 1H), 6.09 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 401 (M + H)⁺, 201 (M + 2H)²⁺;
 TLC : Rf 0.46 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

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Example 11-0048

(3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(methylsulfonyl)-1,3'-bipiperidin-3-amine

- 15 **[0887]** NMR (DMSO- d_6) : δ 1.28 (m, 3H), 1.47 (m, 5H), 1.64 (m, 5H), 1.82 (m, 3H), 2.04 (m, 1H), 2.25 (m, 1H), 2.48 (m, 4H), 2.71 (m, 1H), 2.82 (s, 3H), 2.98 (m, 1H), 3.50 (m, 5H), 3.78 (m, 1H), 5.84 (d, J = 6.00 Hz, 1H), 6.14 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 437 (M + H)⁺, 276, 219 (M + 2H)²⁺;
 TLC : Rf 0.54 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

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Example 11-0049

(3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(methylsulfonyl)-1,4'-bipiperidin-3-amine

- 25 **[0888]** NMR (DMSO- d_6) : δ 1.27 (m, 3H), 1.44 (m, 6H), 1.63 (m, 5H), 1.79 (m, 3H), 1.99 (m, 1H), 2.18 (m, 1H), 2.35 (t, J = 11.10 Hz, 1H), 2.67 (t, J = 11.10 Hz, 3H), 2.82 (s, 3H), 2.98 (m, 1H), 3.52 (m, 5H), 3.80 (m, 1H), 5.83 (d, J = 6.00 Hz, 1H), 6.09 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 873 (2M + H)⁺, 437 (M + H)⁺, 219 (M + 2H)²⁺;
 TLC : Rf 0.63 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

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Example 11-0050

1-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanecarbonitrile

- 35 **[0889]** NMR (DMSO- d_6) : δ 1.29 (m, 3H), 1.47 (m, 6H), 1.69 (m, 9H), 1.88 (m, 1H), 2.07 (m, 3H), 2.90 (m, 1H), 3.15 (m, 3H), 3.53 (m, 4H), 3.83 (m, 1H), 5.84 (d, J = 6.00 Hz, 1H), 6.25 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 765 (2M + H)⁺, 383 (M + H)⁺, 356, 276;
 TLC : Rf 0.26 (AcOEt).

40 Example 11-0051

4-azepan-1-yl-N-[(3S)-1-(1-methylcyclohexyl)piperidin-3-yl]pyrimidin-2-amine

- 45 **[0890]** NMR (DMSO- d_6) : δ 0.77 (s, 3H), 1.18 (m, 6H), 1.44 (m, 7H), 1.67 (m, 9H), 1.88 (m, 1H), 2.07 (m, 1H), 2.70 (m, 1H), 2.99 (m, 1H), 3.53 (m, 4H), 3.81 (m, 1H), 5.82 (d, J = 5.90 Hz, 1H), 6.08 (m, 1H), 7.70 (d, J = 5.90 Hz, 1H);
 MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 276;
 TLC : Rf 0.67 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

50 Example 11-0052

4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone

- 55 **[0891]** NMR (DMSO- d_6) : δ 1.41 (m, 6H), 1.63 (m, 5H), 1.83 (m, 4H), 2.00 (m, 1H), 2.22 (m, 2H), 2.38 (m, 3H), 2.96 (m, 4H), 3.60 (m, 4H), 3.98 (m, 1H), 6.05 (m, 1H), 6.98 (m, 1H), 7.76 (d, J = 6.60 Hz, 1H);
 MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 290, 186.5 (M + 2H)²⁺;
 TLC : Rf 0.67 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0053

4-azepan-1-yl-N-[(3S)-1-(3-methylcyclohexyl)piperidin-3-yl]pyrimidin-2-amine

5 **[0892]** NMR (DMSO- d_6 , 373 K) : δ 0.88 (m, 3H), 1.16 (m, 1H), 1.27 (m, 1H), 1.38 (m, 4H), 1.50 (m, 8H), 1.63 (m, 2H), 1.70 (m, 4H), 1.92 (m, 1H), 2.09 (m, 1H), 2.22 (m, 1H), 2.36 (m, 1H), 2.59 (m, 1H), 2.89 (m, 1H), 3.55 (t, J = 6.00 Hz, 4H), 3.83 (m, 1H), 5.54 (d, J = 8.40 Hz, 1H), 5.83 (d, J = 6.00 Hz, 1H), 7.72 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 276, 186.5 (M + 2H)²⁺;
TLC : R_f 0.42 (AcOEt : MeOH : TEA = 20 : 2 : 1).

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Example 11-0054

4-azepan-1-yl-N-[(3S)-1-(3,5-dimethylcyclohexyl)piperidin-3-yl]pyrimidin-2-amine

15 **[0893]** NMR (DMSO- d_6) : δ 0.53 (m, 2H), 0.80 (m, 6H), 1.45 (m, 8H), 1.65 (m, 8H), 1.83 (m, 2H), 2.17 (m, 1H), 2.48 (m, 2H), 2.70 (m, 1H), 2.93 (m, 1H), 3.50 (m, 4H), 3.77 (m, 1H), 5.82 (d, J = 6.00 Hz, 1H), 6.03 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 386 (M + H)⁺, 276, 193.5 (M + 2H)²⁺;
TLC : R_f 0.47 (AcOEt : MeOH : TEA = 20 : 2 : 1).

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Example 11-0055

4-azepan-1-yl-N-[(3S)-1-(3,4-dimethylcyclopentyl)piperidin-3-yl]pyrimidin-2-amine

25 **[0894]** NMR (DMSO- d_6) : δ 0.86 (m, 6H), 1.05 (m, 2H), 1.29 (m, 4H), 1.45 (m, 4H), 1.66 (m, 8H), 1.89 (m, 2H), 2.58 (m, 2H), 2.96 (m, 1H), 3.49 (m, 4H), 3.73 (m, 1H), 5.82 (d, J = 6.00 Hz, 1H), 6.06 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 276, 186.5 (M + 2H)²⁺;
TLC : R_f 0.42 (AcOEt : MeOH : TEA = 20 : 2 : 1).

30 Example 11-0056

4-azepan-1-yl-N-[(3S)-1-cycloheptylpiperidin-3-yl]pyrimidin-2-amine

35 **[0895]** NMR (DMSO- d_6) : δ 1.44 (m, 14H), 1.66 (m, 10H), 1.97 (m, 1H), 2.18 (m, 1H), 2.45 (m, 2H), 2.86 (m, 1H), 3.51 (m, 4H), 3.71 (m, 1H), 5.82 (d, J = 6.00 Hz, 1H), 6.00 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 276, 186.5 (M + 2H)²⁺;
TLC : R_f 0.42 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0057

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4-azepan-1-yl-N-[(3S)-1-(3,5-dimethylcyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

45 **[0896]** NMR (DMSO- d_6) : δ 0.47 (m, 2H), 0.81 (m, 6H), 1.45 (m, 6H), 1.67 (m, 10H), 2.04 (m, 1H), 2.21 (m, 1H), 2.36 (m, 1H), 2.5 (m, 1H), 2.90 (m, 1H), 3.50 (m, 4H), 4.17 (m, 1H), 5.83 (d, J = 6.00 Hz, 1H), 6.35 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 262;
TLC : R_f 0.42 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0058

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4-azepan-1-yl-N-[(3S)-1-ethylpiperidin-3-yl]pyrimidin-2-amine

55 **[0897]** NMR (DMSO- d_6) : δ 0.96 (t, J = 7.00 Hz, 3H), 1.28 (m, 1H), 1.44 (m, 5H), 1.66 (m, 6H), 1.91 (m, 1H), 2.28 (m, 2H), 2.48 (m, 1H), 2.58 (m, 1H), 2.89 (m, 1H), 3.51 (m, 4H), 3.77 (m, 1H), 5.83 (d, J = 5.90 Hz, 1H), 6.05 (m, 1H), 7.71 (d, J = 5.90 Hz, 1H);
MS (ESI, Pos. 20 V) : 304 (M + H)⁺, 152.5 (M + 2H)²⁺;
TLC : R_f 0.40 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0059

4-azepan-1-yl-N-[1-(1-ethylcyclohexyl)piperidin-3-yl]pyrimidin-2-amine

- 5 **[0898]** NMR (DMSO- d_6) : δ 0.75 (t, J = 7.50 Hz, 3H), 1.30 (m, 9H), 1.45 (m, 6H), 1.69 (m, 9H), 1.96 (m, 1H), 2.16 (m, 1H), 2.73 (m, 1H), 2.99 (m, 1H), 3.50 (m, 4H), 3.74 (m, 1H), 5.81 (d, J = 6.00 Hz, 1H), 6.04 (m, 1H), 7.69 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 386 (M + H)⁺, 276, 111;
TLC : Rf 0.38 (CHCl₃ : MeOH = 10 : 1).

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Example 11-0060

4-azepan-1-yl-N-[1-(1-phenylcyclohexyl)piperidin-3-yl]pyrimidin-2-amine

- 15 **[0899]** NMR (DMSO- d_6) : δ 1.04 (m, 1H), 1.29 (m, 5H), 1.46 (m, 5H), 1.65 (m, 9H), 1.87 (m, 2H), 2.12 (m, 2H), 2.69 (m, 1H), 2.98 (m, 1H), 3.50 (m, 4H), 3.77 (m, 1H), 5.82 (d, J = 6.00 Hz, 1H), 6.03 (m, 1H), 7.19 (m, 1H), 7.29 (m, 4H), 7.69 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 434 (M + H)⁺, 276, 159;
TLC : Rf 0.38 (CHCl₃ : MeOH = 10 : 1).

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Example 11-0061

N-(1-cyclohexylpiperidin-3-yl)-4-(1,4-oxazepan-4-yl)pyrimidin-2-amine

- 25 **[0900]** NMR (CDCl₃) : δ 1.02 (m, 1H), 1.20 (m, 2H), 1.50 (m, 3H), 1.78 (m, 8H), 1.96 (m, 2H), 2.26 (m, 2H), 2.46 (m, 1H), 2.53 (m, 1H), 2.89 (m, 1H), 3.68 (m, 4H), 3.76 (m, 4H), 3.95 (m, 1H), 5.10 (d, J = 9.30 Hz, 1H), 5.76 (d, J = 6.00 Hz, 1H), 7.82 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 360 (M + H)⁺, 278, 180.5 (M + 2H)⁺;
TLC : Rf 0.38 (AcOEt : MeOH : TEA = 20 : 2 : 1).

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Example 11-0062

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclopentylacetyl)-1,4'-bipiperidin-3-amine

- 35 **[0901]** NMR (DMSO- d_6) : δ 1.11 (m, 3H), 1.26 (m, 2H), 1.51 (m, 9H), 1.71 (m, 10H), 1.93 (m, 1H), 2.06 (m, 1H), 2.18 (m, 1H), 2.27 (m, 2H), 2.41 (m, 2H), 2.68 (m, 1H), 2.93 (m, 2H), 3.50 (m, 4H), 3.72 (m, 1H), 3.89 (m, 1H), 4.43 (m, 1H), 5.83 (d, J = 6.00 Hz, 1H), 6.10 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 469 (M + H)⁺, 359, 235 (M + 2H)²⁺, 180;
TLC : Rf 0.66 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

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Example 11-0063

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(tert-butyl)-1,4'-bipiperidin-1'-carboxamide

- 45 **[0902]** NMR (DMSO- d_6) : δ 1.21 (s, 9H), 1.30 (m, 3H), 1.45 (m, 5H), 1.67 (m, 8H), 1.96 (m, 1H), 2.15 (m, 1H), 2.37 (m, 3H), 2.68 (m, 1H), 2.96 (m, 1H), 3.52 (m, 4H), 3.76 (m, 1H), 3.98 (m, 2H), 5.68 (s, 1H), 5.84 (d, J = 6.00 Hz, 1H), 6.13 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H); MS (ESI, Pos. 20 V) : 458 (M + H)⁺, 276, 180;
TLC : Rf 0.53 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

50 Example 11-0064

isopropyl 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidine-1'-carboxylate

- 55 **[0903]** NMR (DMSO- d_6) : δ 1.15 (d, J = 6.20 Hz, 6H), 1.27 (m, 3H), 1.45 (m, 5H), 1.69 (m, 8H), 1.97 (m, 1H), 2.19 (m, 1H), 2.38 (m, 1H), 2.72 (m, 3H), 3.00 (m, 1H), 3.50 (m, 4H), 3.74 (m, 1H), 3.99 (m, 2H), 4.74 (m, 1H), 5.84 (d, J = 6.20 Hz, 1H), 6.15 (m, 1H), 7.70 (d, J = 6.20 Hz, 1H);
MS (ESI, Pos. 20 V) : 445 (M + H)⁺, 359, 276, 202;
TLC : Rf 0.57 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0065

(3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclohexylcarbonyl)-1,4'-bipiperidin-3-amine noncrystalline material;

5 **[0904]** NMR (CDCl₃) : δ 1.24 (m, 4H), 1.52 (m, 8H), 1.71 (m, 15H), 2.25 (m, 1H), 2.47 (m, 4H), 2.95 (m, 2H), 3.55 (m, 4H), 3.96 (m, 2H), 4.64 (m, 1H), 5.01 (m, 1H), 5.75 (d, J = 6.00 Hz, 1H), 7.77 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 469 (M + H)⁺, 359, 318, 212, 111;
TLC : R_f 0.48 (AcOEt : MeOH : TEA = 20 : 2 : 1).

10 Example 11-0066

(3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclopentylcarbonyl)-1,4'-bipiperidin-3-amine

15 **[0905]** NMR (DMSO-d₆) : δ 1.20 (m, 4H), 1.44 (m, 7H), 1.69 (m, 14H), 1.96 (m, 1H), 2.20 (m, 1H), 2.40 (m, 1H), 2.68 (m, 1H), 2.96 (m, 3H), 3.51 (m, 4H), 3.76 (m, 1H), 4.03 (m, 1H), 4.45 (m, 1H), 5.84 (d, J = 6.00 Hz, 1H), 6.16 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 455 (M + H)⁺, 359;
TLC : R_f 0.53 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

20 Example 11-0067

(3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-methylbutanoyl)-1,4'-bipiperidin-3-amine

25 **[0906]** NMR (DMSO-d₆) : δ 0.77 (t, J = 7.40 Hz, 3H), 0.94 (m, 3H), 1.19 (m, 5H), 1.46 (m, 6H), 1.71 (m, 8H), 1.97 (m, 1H), 2.20 (m, 1H), 2.39 (m, 1H), 2.66 (m, 2H), 3.00 (m, 2H), 3.50 (m, 4H), 3.75 (m, 1H), 4.01 (m, 1H), 4.46 (m, 1H), 5.84 (d, J = 6.00 Hz, 1H), 6.15 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 443 (M + H)⁺, 359;
TLC : R_f 0.51 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

30 Example 11-0068

(3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclopentylacetyl)-1,4'-bipiperidin-3-amine

35 **[0907]** NMR (DMSO-d₆) : δ 1.05 (m, 3H), 1.28 (m, 3H), 1.47 (m, 8H), 1.71 (m, 11H), 1.95 (m, 1H), 2.08 (m, 1H), 2.19 (m, 1H), 2.28 (m, 2H), 2.41 (m, 1H), 2.68 (m, 1H), 2.96 (m, 2H), 3.51 (m, 4H), 3.73 (m, 1H), 3.93 (m, 1H), 4.39 (m, 1H), 5.84 (d, J = 6.00 Hz, 1H), 6.12 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 469 (M + H)⁺, 359, 180;
TLC : R_f 0.53 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

40 Example 11-0069

(3S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-fluorobenzoyl)-1,4'-bipiperidin-3-amine

45 **[0908]** NMR (DMSO-d₆) : δ 1.36 (m, 9H), 1.67 (m, 8H), 2.01 (m, 1H), 2.24 (m, 2H), 2.71 (m, 2H), 3.02 (m, 2H), 3.51 (m, 4H), 3.79 (m, 1H), 4.50 (m, 1H), 5.85 (d, J = 6.00 Hz, 1H), 6.22 (m, 1H), 7.22 (m, 3H), 7.47 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 481 (M + H)⁺, 359, 241 (M + 2H)²⁺, 123;
TLC : R_f 0.62 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

50 Example 11-0070

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(piperidin-1-ylcarbonyl)-1,4'-bipiperidin-3-amine

55 **[0909]** NMR (DMSO-d₆) : δ 1.23 (m, 3H), 1.47 (m, 11H), 1.70 (m, 8H), 1.96 (m, 1H), 2.21 (m, 1H), 2.38 (m, 2H), 2.63 (m, 3H), 2.91 (m, 1H), 3.10 (m, 4H), 3.52 (m, 5H), 3.79 (m, 1H), 5.84 (d, J = 6.00 Hz, 1H), 6.14 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 470 (M + H)⁺, 359, 112;
TLC : R_f 0.65 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0071

4-azepan-1-yl-N-(3-piperidin-1-ylcyclohexyl)pyrimidin-2-amine

5 **[0910]** NMR (DMSO- d_6) : δ 1.31 (m, 3H), 1.49 (m, 13H), 1.69 (m, 6H), 2.38 (m, 5H), 3.54 (m, 4H), 4.10 (m, 1H), 5.81 (d, J = 6.00 Hz, 1H), 6.07 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 358 (M + H)⁺, 179.5 (M + 2H)²⁺;
 TLC : Rf 0.74 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10 Example 11-0072

4-azepan-1-yl-N-(1,4-trans-4-piperidin-1-ylcyclohexyl)pyrimidin-2-amine

15 **[0911]** NMR (DMSO- d_6) : δ 1.18 (m, 3H), 1.33 (m, 3H), 1.47 (m, 8H), 1.69 (m, 6H), 1.94 (m, 2H), 2.20 (m, 1H), 2.42 (m, 4H), 3.57 (m, 5H), 5.81 (d, J = 6.00 Hz, 1H), 6.14 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 715 (2M + H)⁺, 358 (M + H)⁺, 179.5 (M + 2H)²⁺;
 TLC : Rf 0.45 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0073

20 4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanecarboxylic acid dihydrochloride

[0912] NMR (CD₃OD) : δ 1.61 (m, 8H), 1.86 (m, 5H), 2.23 (m, 7H), 2.69 (m, 1H), 2.84 (m, 1H), 3.05 (m, 1H), 3.51 (m, 1H), 3.72 (m, 4H), 3.96 (m, 2H), 4.47 (m, 1H), 6.43 (d, J = 7.50 Hz, 1H), 7.69 (d, J = 7.50 Hz, 1H);
 25 MS (ESI, Pos. 20 V) : 402 (M + H)⁺, 304, 276, 201.5 (M + 2H)²⁺;
 TLC : Rf 0.64 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0074

30 1,4-trans-4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanol

[0913] NMR (DMSO- d_6) : δ 1.12 (m, 5H), 1.42 (m, 5H), 1.63 (m, 8H), 1.79 (m, 2H), 1.94 (m, 1H), 2.22 (m, 2H), 2.64 (m, 1H), 2.92 (m, 1H), 3.50 (m, 4H), 3.77 (m, 2H), 4.44 (d, J = 4.20 Hz, 1H), 5.82 (d, J = 6.00 Hz, 1H), 6.10 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
 35 MS (FAB, Pos.) : 374 (M + H)⁺;
 TLC : Rf 0.33 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0075

40 4-azepan-1-yl-N-[(1R*,2R*)-2-piperidin-1-ylcyclohexyl]pyrimidin-2-amine

[0914] NMR (DMSO- d_6) : δ 1.09 (m, 5H), 1.32 (m, 6H), 1.45 (m, 4H), 1.63 (m, 6H), 1.83 (m, 1H), 2.31 (m, 5H), 3.57 (m, 5H), 5.74 (d, J = 4.80 Hz, 1H), 5.84 (d, J = 6.00 Hz, 1H), 7.71 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 358 (M + H)⁺, 179.5 (M + 2H)²⁺;
 45 TLC : Rf 0.43 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0076

1,4-シス-4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanol noncrystalline material;

50 **[0915]** NMR (DMSO- d_6) : δ 1.29 (m, 7H), 1.46 (m, 4H), 1.68 (m, 9H), 1.95 (m, 1H), 2.22 (m, 2H), 2.64 (m, 1H), 2.95 (m, 1H), 3.49 (m, 4H), 3.77 (m, 2H), 4.22 (d, J = 3.30 Hz, 1H), 5.83 (d, J = 6.00 Hz, 1H), 6.13 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
 MS (FAB, Pos.) : 374 (M + H)⁺;
 55 TLC : Rf 0.33 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0077

1-2-[(1-cyclohexyl)piperidin-3-yl]amino]pyrimidin-4-ylazepan-4-ol

- 5 **[0916]** NMR (DMSO- d_6) : δ 1.08 (m, 6H), 1.49 (m, 7H), 1.72 (m, 5H), 1.84 (m, 2H), 2.01 (m, 1H), 2.24 (m, 2H), 2.63 (m, 1H), 2.98 (m, 1H), 3.48 (m, 4H), 3.64 (m, 1H), 3.79 (m, 1H), 4.49 (d, J = 3.80 Hz, 1H), 5.82 (d, J = 6.00 Hz, 1H), 6.10 (m, 1H), 7.71 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 374 (M + H)⁺, 292, 187.5 (M + 2H)²⁺;
 TLC : Rf 0.46 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

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Example 11-0078

(4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)(cyclohexyl)methanone

- 15 **[0917]** NMR (CDCl₃) : δ 1.27 (m, 4H), 1.53 (m, 10H), 1.74 (m, 11H), 1.92 (m, 4H), 2.04 (m, 1H), 2.26 (m, 2H), 2.46 (m, 4H), 2.91 (m, 1H), 3.55 (m, 4H), 3.98 (m, 1H), 5.05 (m, 1H), 5.75 (m, 1H), 7.78 (m, 1H);
 MS (ESI, Pos. 20 V) : 468 (M + H)⁺, 276, 234.5 (M + 2H)²⁺, 193;
 TLC : Rf 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

20 Example 11-0079

N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²-cyclohexyl-N²-ethylethane-1,2-diamine

- 25 **[0918]** NMR (DMSO- d_6) : δ 0.95 (t, J = 7.00 Hz, 3H), 1.16 (m, 5H), 1.41 (m, 4H), 1.54 (m, 1H), 1.74 (m, 8H), 2.37 (m, 5H), 3.17 (m, 2H), 3.62 (m, 4H), 5.81 (d, J = 6.00 Hz, 1H), 6.17 (m, 1H), 7.69 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 346 (M + H)⁺, 264, 173.5 (M + 2H)²⁺;
 TLC : Rf 0.44 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0080

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N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²-cyclohexylethane-1,2-diamine

- 35 **[0919]** NMR (DMSO- d_6) : δ 0.92 (m, 2H), 1.19 (m, 3H), 1.45 (m, 5H), 1.63 (m, 6H), 1.79 (m, 2H), 2.27 (m, 1H), 2.65 (t, J = 6.50 Hz, 2H), 3.20 (m, 2H), 3.62 (m, 4H), 5.83 (d, J = 6.00 Hz, 1H), 6.25 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
 MS (FAB, Pos.) : 318 (M + H)⁺, 219, 206, 193;
 TLC : Rf 0.49 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0081

40 N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²-cyclohexyl-N²-methylethane-1,2-diamine

- [0920]** NMR (DMSO- d_6) : δ 1.14 (m, 5H), 1.44 (m, 4H), 1.54 (m, 1H), 1.71 (m, 8H), 2.19 (s, 3H), 2.30 (m, 2H), 2.42 (m, 1H), 3.18 (m, 2H), 3.62 (m, 4H), 5.82 (d, J = 6.00 Hz, 1H), 6.11 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 332 (M + H)⁺, 250;
 45 TLC : Rf 0.42 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0082

N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²-methyl-N²-tetrahydro-2H-pyran-4-ylethane-1,2-diamine

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- [0921]** NMR (DMSO- d_6) : δ 1.38 (dd, J = 12.40, 4.50 Hz, 1H), 1.45 (m, 5H), 1.65 (m, 6H), 2.20 (s, 3H), 2.42 (m, 1H), 2.53 (m, 2H), 3.23 (m, 4H), 3.55 (m, 4H), 3.85 (dd, J = 11.10, 4.10 Hz, 2H), 5.83 (d, J = 6.00 Hz, 1H), 6.15 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 334 (M + H)⁺, 276, 250;
 55 TLC : Rf 0.52 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0083

(1R*,2S*)-N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²-cyclohexylcyclohexane-1,2-diamine

5 **[0922]** NMR (DMSO-d₆) : δ 0.83 (m, 1H), 1.09 (m, 4H), 1.25 (m, 3H), 1.44 (m, 8H), 1.70 (m, 10H), 2.34 (m, 1H), 2.87 (m, 1H), 3.55 (m, 4H), 3.83 (m, 1H), 5.78 (m, 1H), 5.83 (d, J = 6.00 Hz, 1H), 7.70 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 290, 186.5 (M + 2H)²⁺;
 TLC : R_f 0.54 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10 Example 11-0084

(1R*,2R*)-N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²-cyclohexylcyclohexane-1,2-diamine

15 **[0923]** NMR (DMSO-d₆) : δ 0.99 (m, 8H), 1.42 (m, 6H), 1.64 (m, 10H), 1.86 (m, 2H), 2.41 (m, 3H), 3.49 (m, 4H), 5.82 (d, J = 6.00 Hz, 1H), 6.10 (m, 1H), 7.70 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 290, 186.5 (M + 2H)²⁺;
 TLC : R_f 0.54 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

20 Example 11-0085

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-ylacetic acid dihydrochloride

25 **[0924]** NMR (CD₃OD) : δ 1.61 (m, 4H), 1.86 (m, 5H), 2.14 (m, 3H), 2.24 (m, 2H), 2.49 (m, 2H), 2.92 (m, 1H), 3.06 (m, 1H), 3.23 (m, 1H), 3.65 (m, 5H), 3.81 (m, 3H), 4.00 (m, 1H), 4.09 (m, 1H), 4.14 (s, 2H), 4.59 (m, 1H), 6.43 (d, J = 7.70 Hz, 1H), 7.69 (d, J = 7.70 Hz, 1H);
 MS (ESI, Pos. 20 V) : 833 (2M + H)⁺, 417 (M + H)⁺, 276, 209 (M + 2H)²⁺;
 TLC : R_f 0.22 (CHCl₃ : MeOH : NH₄OH = 20 : 5 : 1).

30 Example 11-0086

3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-ylpropionic acid dihydrochloride

35 **[0925]** NMR (CD₃OD) : δ 1.61 (m, 4H), 1.83 (m, 5H), 2.12 (m, 3H), 2.24 (m, 2H), 2.49 (m, 2H), 2.88 (t, J = 6.80 Hz, 2H), 3.17 (m, 2H), 3.44 (t, J = 6.80 Hz, 2H), 3.69 (m, 8H), 3.98 (m, 2H), 4.07 (m, 1H), 4.56 (m, 1H), 6.43 (d, J = 7.50 Hz, 1H), 7.69 (d, J = 7.50 Hz, 1H);
 MS (ESI, Pos. 20 V) : 431 (M + H)⁺, 304, 276, 216 (M + 2H)²⁺, 156;
 TLC : R_f 0.22 (CHCl₃ : MeOH : NH₄OH = 20 : 5 : 1).

40 Example 11-0087

4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-ylbutyric acid dihydrochloride

45 **[0926]** NMR (CD₃OD) : δ 1.62 (m, 4H), 1.86 (m, 5H), 2.14 (m, 5H), 2.48 (m, 4H), 2.90 (m, 1H), 3.12 (m, 4H), 3.72 (m, 9H), 3.99 (m, 2H), 4.07 (m, 1H), 4.56 (m, 1H), 6.43 (d, J = 8.10 Hz, 1H), 7.69 (d, J = 8.10 Hz, 1H);
 MS (ESI, Pos. 20 V) : 445 (M + H)⁺, 276, 223 (M + 2H)²⁺, 170;
 TLC : R_f 0.22 (CHCl₃ : MeOH : NH₄OH = 20 : 5 : 1).

Example 11-0088

50 methyl (4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)acetate

55 **[0927]** NMR (CDCl₃) : δ 1.01 (m, 1H), 1.28 (m, 1H), 1.54 (m, 9H), 1.74 (m, 8H), 1.92 (m, 2H), 2.10 (m, 1H), 2.24 (m, 3H), 2.49 (m, 2H), 2.90 (m, 1H), 3.57 (m, 4H), 3.66 (s, 3H), 3.99 (m, 1H), 5.15 (m, 1H), 5.76 (m, 1H), 7.79 (m, 1H);
 MS (ESI, Pos. 20 V) : 430 (M + H)⁺, 276, 215.5 (M + 2H)²⁺, 123;
 TLC : R_f 0.48 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0089

methyl 3-(4-(4-azepan-1-ylpyrimidin-2-yl)amino)piperidin-1-ylcyclohexyl)propanoate

5 **[0928]** NMR (CDCl₃) : δ 0.93 (m, 1H), 1.24 (m, 1H), 1.54 (m, 11H), 1.74 (m, 8H), 2.00 (m, 2H), 2.28 (m, 4H), 2.48 (m, 2H), 2.91 (m, 1H), 3.58 (m, 4H), 3.67 (s, 3H), 3.99 (m, 1H), 5.12 (m, 1H), 5.76 (m, 1H), 7.79 (m, 1H);
MS (ESI, Pos. 20 V) : 444 (M + H)⁺, 276, 222.5 (M + 2H)²⁺, 137;
TLC : R_f 0.48 (AcOEt : MeOH : TEA = 20 : 2 : 1).

10 Example 11-0090

(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)acetic acid hydrochloride

15 **[0929]** NMR (CD₃OD) : δ 1.18 (m, 1H), 1.61 (m, 4H), 1.85 (m, 6H), 1.97 (m, 2H), 2.17 (m, 6H), 2.42 (m, 2H), 2.86 (m, 1H), 3.04 (m, 1H), 3.24 (m, 1H), 3.53 (m, 1H), 3.70 (m, 3H), 3.83 (m, 1H), 3.92 (m, 1H), 4.05 (m, 1H), 4.52 (m, 1H), 5.00 (d, J = 4.80 Hz, 1H), 6.43 (d, J = 7.70 Hz, 1H), 7.70 (d, J = 7.70 Hz, 1H);
MS (ESI, Pos. 20 V) : 416 (M + H)⁺, 276, 208.5 (M + 2H)²⁺, 123;
TLC : R_f 0.53 (CHCl₃ : MeOH : NH₄OH = 20 : 5 : 1).

20 Example 11-0091

3-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)propionic acid hydrochloride

25 **[0930]** NMR (CD₃OD) : δ 1.10 (m, 1H), 1.62 (m, 4H), 1.86 (m, 10H), 2.23 (m, 6H), 2.49 (t, J = 8.20 Hz, 2H), 2.85 (m, 1H), 3.04 (m, 1H), 3.24 (m, 1H), 3.56 (m, 1H), 3.72 (m, 2H), 3.84 (m, 2H), 3.97 (m, 3H), 4.48 (m, 1H), 6.43 (d, J = 7.70 Hz, 1H), 7.69 (d, J = 7.70 Hz, 1H); MS (ESI, Pos. 20 V) : 430 (M + H)⁺, 276, 215.5 (M + 2H)²⁺, 138;
TLC : R_f 0.53 (CHCl₃ : MeOH : NH₄OH = 20 : 5 : 1).

Example 11-0092

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3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N,N-dimethyl-1,4'-bipiperidine-1'-sulfonamide

35 **[0931]** NMR (CDCl₃) : δ 1.55 (m, 8H), 1.75 (m, 8H), 2.27 (m, 1H), 2.38 (m, 1H), 2.47 (m, 1H), 2.57 (m, 1H), 2.79 (m, 2H), 2.80 (s, 6H), 2.93 (m, 1H), 3.59 (m, 4H), 3.73 (m, 2H), 4.00 (m, 1H), 5.38 (m, 1H), 5.78 (d, J = 6.20 Hz, 1H), 7.77 (d, J = 6.20 Hz, 1H);
MS (ESI, Pos. 20 V) : 931 (2M + H)⁺, 466 (M + H)⁺, 276, 211;
TLC : R_f 0.35 (CHCl₃ : MeOH = 10 : 1).

Example 11-0093

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4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-(cyclohexylmethyl)oxime

45 **[0932]** NMR (CDCl₃) : δ 0.95 (m, 2H), 1.23 (m, 3H), 1.54 (m, 8H), 1.72 (m, 12H), 1.92 (m, 2H), 2.08 (m, 1H), 2.28 (m, 1H), 2.49 (m, 4H), 2.92 (m, 1H), 3.21 (m, 1H), 3.56 (m, 5H), 3.80 (d, J = 6.40 Hz, 2H), 4.00 (m, 1H), 5.08 (m, 1H), 5.76 (d, J = 6.00 Hz, 1H), 7.79 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 966 (2M + H)⁺, 483 (M + H)⁺, 242 (M + 2H)²⁺;
TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0094

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4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-cycloheptyloxime

55 **[0933]** NMR (CDCl₃) : δ 1.54 (m, 18H), 1.75 (m, 5H), 1.85 (m, 2H), 1.94 (m, 3H), 2.07 (m, 1H), 2.28 (m, 1H), 2.50 (m, 4H), 2.92 (m, 1H), 3.22 (m, 1H), 3.56 (m, 4H), 3.74 (m, 1H), 3.99 (m, 1H), 4.16 (m, 1H), 5.08 (m, 1H), 5.76 (d, J = 6.00 Hz, 1H), 7.79 (d, J = 6.00 Hz, 1H); MS (ESI, Pos. 20 V) : 966 (2M + H)⁺, 483 (M + H)⁺, 276, 194;
TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0095

4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-cyclohexoxyloxime

[0934] NMR (CDCl₃) : δ 1.33 (m, 5H), 1.54 (m, 8H), 1.74 (m, 8H), 1.82 (m, 2H), 1.90 (m, 3H), 2.08 (m, 1H), 2.28 (m, 1H), 2.49 (m, 4H), 2.93 (m, 1H), 3.25 (m, 1H), 3.56 (m, 5H), 3.98 (m, 2H), 5.07 (m, 1H), 5.76 (d, J = 6.00 Hz, 1H), 7.79 (d, J = 6.00 Hz, 1H);

MS (ESI, Pos. 20 V) : 469 (M + H)⁺, 276, 194;

TLC : R_f 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0096

4-azepan-1-yl-N-[1,4-trans-1-(4-phenoxy-cyclohexyl)piperidin-3-yl]pyrimidin-2-amine

[0935] NMR (CDCl₃) : δ 0.85 (m, 1H), 1.42 (m, 4H), 1.54 (m, 4H), 1.75 (m, 8H), 1.92 (m, 2H), 2.18 (m, 1H), 2.28 (m, 1H), 2.43 (m, 2H), 2.58 (m, 1H), 2.96 (m, 1H), 3.58 (m, 4H), 4.00 (m, 1H), 4.12 (m, 1H), 5.34 (m, 1H), 5.78 (d, J = 6.00 Hz, 1H), 6.88 (d, J = 7.50 Hz, 2H), 6.92 (t, J = 7.50 Hz, 1H), 7.26 (t, J = 7.50 Hz, 2H), 7.77 (d, J = 6.00 Hz, 1H);

MS (ESI, Pos. 20 V) : 899 (2M + H)⁺, 450 (M + H)⁺, 276;

TLC : R_f 0.23 (CHCl₃ : MeOH = 10 : 1).

Example 11-0097

benzyl 4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexylcarbamate

[0936] NMR (CDCl₃) : δ 1.12 (m, 1H), 1.53 (m, 10H), 1.74 (m, 8H), 2.05 (m, 1H), 2.24 (m, 2H), 2.47 (m, 2H), 2.88 (m, 1H), 3.56 (m, 4H), 3.78 (m, 1H), 3.99 (m, 1H), 4.98 (m, 1H), 5.09 (s, 2H), 5.37 (m, 1H), 5.76 (d, J = 6.20 Hz, 1H), 7.36 (m, 5H), 7.76 (d, J = 6.20 Hz, 1H); MS (ESI, Pos. 20 V) : 507 (M + H)⁺, 415, 373, 276;

TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0098

benzyl (4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)methylcarbamate

[0937] NMR (CDCl₃) : δ 0.96 (m, 1H), 1.53 (m, 11H), 1.74 (m, 8H), 2.09 (m, 1H), 2.26 (m, 2H), 2.46 (m, 2H), 2.84 (m, 1H), 3.09 (m, 2H), 3.56 (m, 4H), 3.99 (m, 1H), 4.81 (m, 1H), 5.10 (s, 2H), 5.21 (m, 1H), 5.76 (d, J = 6.20 Hz, 1H), 7.35 (m, 5H), 7.78 (d, J = 6.20 Hz, 1H); MS (ESI, Pos. 20 V) : 521 (M + H)⁺, 431, 387, 276;

TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0099

N-(4-azepan-1-ylpyrimidin-2-yl)-1-methylpiperidine-3-carboxamide

[0938] NMR (DMSO-d₆) : δ 1.41 (m, 6H), 1.68 (m, 6H), 1.87 (m, 1H), 2.00 (m, 1H), 2.14 (s, 3H), 2.61 (m, 1H), 2.74 (m, 1H), 2.97 (m, 1H), 3.48 (m, 2H), 3.70 (m, 2H), 6.31 (d, J = 6.2 Hz, 1 H) 7.96 (d, J = 6.2 Hz, 1H), 9.90 (s, 1H);

MS (FAB, Pos.) : 318 (M + H)⁺;

TLC : R_f 0.52 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0100

N-[1-(4-aminocyclohexyl)piperidin-3-yl]-4-azepan-1-ylpyrimidin-2-amine

[0939] NMR (CDCl₃) : δ 1.22 (m, 1H), 1.55 (m, 7H), 1.76 (m, 12H), 2.25 (m, 1H), 2.44 (m, 1H), 2.59 (m, 1H), 2.75 (m, 0.5H), 2.96 (m, 0.5H), 3.14 (m, 2H), 3.57 (m, 4H), 4.02 (m, 1H), 5.30 (m, 0.5H), 5.79 (m, 1.5H), 7.75 (m, 1H);

MS (ESI, Pos. 20 V) : 373 (M + H)⁺, 178;

TLC : R_f 0.55 (CHCl₃ : MeOH : NH₄OH = 80 : 20 : 2).

Example 11-0101

N-1-[4-(aminomethyl)cyclohexyl]piperidin-3-yl-4-azepan-1-ylpyrimidin-2-amine

- 5 **[0940]** NMR (CDCl₃) : δ 0.93 (m, 1H), 1.24 (m, 2H), 1.54 (m, 8H), 1.65 (m, 3H), 1.75 (m, 5H), 1.86 (m, 2H), 2.26 (m, 2H), 2.50 (m, 2H), 2.63 (m, 2H), 2.85 (m, 0.5H), 2.97 (m, 0.5H), 3.57 (m, 4H), 4.00 (m, 1H), 5.18 (m, 1H), 5.76 (d, J = 6.20 Hz, 1H), 7.79 (m, 1H);
 MS (ESI, Pos. 20 V) : 387 (M + H)⁺, 276, 194 (M + 2H)²⁺, 185;
 TLC : R_f 0.55 (CHCl₃ : MeOH : NH₄OH = 80 : 20 : 2).

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Example 11-0102

4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-yl-1-methylcyclohexanol

- 15 **[0941]** NMR (CDCl₃) : δ 1.22 (m, 3H), 1.42 (m, 3H), 1.54 (m, 5H), 1.64 (m, 4H), 1.75 (m, 8H), 2.28 (m, 2H), 2.47 (m, 1H), 2.57 (m, 1H), 2.95 (m, 1H), 3.58 (m, 4H), 3.77 (m, 1H), 4.00 (m, 1H), 5.16 (m, 1H), 5.76 (m, 1H), 7.79 (m, 1H);
 MS (ESI, Pos. 20 V) : 388 (M + H)⁺, 304, 276, 193;
 TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

20 Example 11-0103

N-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)methanesulfonamide

- 25 **[0942]** NMR (CDCl₃) : δ 1.30 (m, 2H), 1.54 (m, 5H), 1.61 (m, 3H), 1.74 (m, 6H), 1.85 (m, 2H), 2.11 (m, 1H), 2.25 (m, 1H), 2.42 (m, 2H), 2.52 (m, 2H), 2.76 (m, 1H), 2.89 (m, 0.5H), 2.97 (s, 3H), 3.21 (m, 0.5H), 3.57 (m, 4H), 4.02 (m, 1H), 4.60 (m, 0.5H), 4.93 (m, 0.5H), 5.20 (m, 1H), 5.76 (m, 1H), 7.78 (m, 1H);
 MS (ESI, Pos. 20 V) : 451 (M + H)⁺, 356, 276, 226 (M + 2H)²⁺, 178;
 TLC : R_f 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

30 Example 11-0104

N-[(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)methyl]methanesulfonamide

- 35 **[0943]** NMR (CDCl₃) : δ 0.98 (m, 1H), 1.26 (m, 1H), 1.54 (m, 10H), 1.74 (m, 8H), 1.87 (m, 1H), 2.03 (m, 1H), 2.36 (m, 3H), 2.56 (m, 0.5H), 2.75 (m, 0.5H), 2.95 (m, 4H), 3.08 (m, 1H), 3.56 (m, 4H), 4.02 (m, 1H), 4.43 (m, 0.5H), 4.69 (m, 0.5H), 5.21 (m, 1H), 5.76 (d, J = 6.00 Hz, 1H), 7.78 (d, J = 6.00 Hz, 1H);
 MS (ESI, Pos. 20 V) : 465 (M + H)⁺, 276, 233 (M + 2H)²⁺, 138;
 TLC : R_f 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

40 Example 11-0105

N-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)cyclohexanecarboxamide

- 45 **[0944]** NMR (CDCl₃) : δ 1.11 (m, 1H), 1.25 (m, 2H), 1.54 (m, 10H), 1.75 (m, 15H), 2.04 (m, 2H), 2.23 (m, 1H), 2.41 (m, 3H), 2.87 (m, 1H), 3.56 (m, 5H), 4.00 (m, 2H), 5.13 (m, 1.5H), 5.61 (m, 0.5H), 5.77 (m, 1H), 7.79 (d, J = 6.20 Hz, 1H);
 MS (FAB, Pos., matrix = Glycerin + m-NBA) : 483 (M + H)⁺, 193;
 TLC : R_f 0.50 (AcOEt : MeOH : TEA = 20 : 10 : 1).

50 Example 11-0106

N-[(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)methyl]cyclohexanecarboxamide

- 55 **[0945]** NMR (CDCl₃) : δ 0.97 (m, 1H), 1.25 (m, 4H), 1.54 (m, 11H), 1.75 (m, 15H), 2.06 (m, 1H), 2.29 (m, 2H), 2.47 (m, 2H), 2.89 (m, 1H), 3.08 (m, 1H), 3.21 (m, 1H), 3.57 (m, 4H), 4.02 (m, 1H), 5.46 (m, 1H), 5.63 (m, 1H), 5.78 (m, 1H), 7.76 (m, 1H);
 MS (FAB, Pos., matrix = Glycerin + m-NBA) : 497 (M + H)⁺, 193;
 TLC : R_f 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0107

N-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)acetamide

- 5 **[0946]** NMR (CDCl₃) : δ 1.13 (m, 1H), 1.55 (m, 11H), 1.74 (m, 8H), 1.96 (m, 3H), 2.33 (m, 3.5H), 2.55 (m, 0.5H), 2.72 (m, 0.5H), 2.92 (m, 0.5H), 3.58 (m, 4H), 4.01 (m, 2H), 5.15 (m, 0.5H), 5.32 (m, 1H), 5.76 (m, 1H), 5.94 (m, 0.5H), 7.78 (m, 1H);
MS (ESI, Pos. 20 V) : 415 (M + H)⁺, 276, 208 (M + 2H)²⁺, 140;
TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

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Example 11-0108

N-[(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)methyl]acetamide

- 15 **[0947]** NMR (CDCl₃) : δ 0.97 (m, 1H), 1.25 (m, 1H), 1.54 (m, 9H), 1.74 (m, 6H), 1.86 (m, 4H), 1.99 (m, 3H), 2.24 (m, 1H), 2.43 (m, 3H), 2.74 (m, 0.5H), 2.94 (m, 0.5H), 3.17 (m, 2H), 3.56 (m, 4H), 4.02 (m, 1H), 5.20 (m, 1H), 5.49 (m, 0.5H), 5.76 (m, 1H), 5.81 (m, 0.5H), 7.78 (m, 1H);
MS (ESI, Pos. 20 V) : 429 (M + H)⁺, 276, 215 (M + 2H)²⁺, 154;
TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

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Example 11-0109

N-(4-azepan-1-ylpyrimidin-2-yl)-1-methylpiperidine-2-carboxamide

- 25 **[0948]** NMR (CDCl₃) : δ 1.68 (m, 12H), 2.08 (m, 3H), 2.29 (s, 3H), 2.64 (m, 1H), 2.97 (m, 1H), 3.63 (m, 4H), 6.14 (d, J = 6.2 Hz, 1H), 8.09 (d, J = 6.2 Hz, 1H), 8.84 (s, 1H);
MS (FAB, Pos.) : 318 (M + H)⁺;
TLC : R_f 0.50 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

30 Example 11-0110

N'-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)-N,N-dimethylsulfamide

- 35 **[0949]** NMR (CDCl₃) : δ 1.26 (m, 2H), 1.57 (m, 8H), 1.75 (m, 8H), 2.07 (m, 2H), 2.29 (m, 2H), 2.47 (m, 2H), 2.79 (m, 6H), 2.97 (m, 1H), 3.54 (m, 4.5H), 4.01 (m, 1.5H), 4.47 (m, 1H), 5.18 (m, 1H), 5.76 (m, 1H), 7.78 (m, 1H);
MS (FAB, pos. matrix = Glycerin + m-NBA) : 480 (M + H)⁺, 371, 287, 243, 217, 193, 122;
TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

40 Example 11-0111

N'-[(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)methyl]-N,N-dimethylsulfamide

- 45 **[0950]** NMR (CDCl₃) : δ 0.97 (m, 1H), 1.26 (m, 1H), 1.54 (m, 10H), 1.74 (m, 4H), 1.87 (m, 3H), 2.26 (m, 2H), 2.45 (m, 2H), 2.57 (m, 1H), 2.81 (m, 6H), 2.88 (m, 1H), 3.00 (m, 1H), 3.57 (m, 5H), 4.01 (m, 1.5H), 4.13 (m, 0.5H), 4.31 (m, 0.5H), 4.81 (m, 0.5H), 5.16 (m, 1H), 5.76 (d, J = 6.20 Hz, 1H), 7.78 (d, J = 6.20 Hz, 1H);
MS (FAB, Pos., matrix = Glycerin + m-NBA) : 494 (M + H)⁺, 301, 257, 217, 193, 122; TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

50 Example 11-0112

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cycloheptylcarbonyl)-1,4'-bipiperidin-3-amine

- 55 **[0951]** NMR (CDCl₃) : δ 1.55 (m, 13H), 1.75 (m, 15H), 2.26 (m, 1H), 2.53 (m, 5H), 2.97 (m, 2H), 3.56 (m, 4H), 3.95 (m, 2H), 4.65 (m, 1H), 5.08 (m, 1H), 5.77 (d, J = 6.20 Hz, 1H), 7.79 (d, J = 6.20 Hz, 1H);
MS (ESI, Pos. 20 V) : 483 (M + H)⁺, 359;
TLC : R_f 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0113

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(tetrahydro-2H-pyran-4-ylcarbonyl)-1,4'-bipiperidin-3-amine

- 5 **[0952]** NMR (CDCl₃) : δ 1.55 (m, 9H), 1.74 (m, 6H), 1.84 (m, 5H), 2.27 (m, 1H), 2.52 (m, 4H), 2.73 (m, 1H), 2.96 (m, 2H), 3.44 (m, 2H), 3.57 (m, 4H), 3.99 (m, 4H), 4.65 (m, 1H), 5.18 (m, 1H), 5.77 (d, J = 6.20 Hz, 1H), 7.78 (d, J = 6.20 Hz, 1H);
MS (ESI, Pos. 20 V) : 471 (M + H)⁺, 359, 304;
TLC : Rf 0.33 (AcOEt : MeOH : TEA = 20 : 2 : 1).

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Example 11-0114

4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-yl-1-phenylcyclohexanol

- 15 **[0953]** NMR (CDCl₃) : δ 1.54 (m, 7H), 1.80 (m, 13H), 2.43 (m, 4H), 2.64 (m, 1H), 3.03 (m, 1H), 3.55 (m, 4H), 4.01 (m, 1H), 5.13 (m, 1H), 5.75 (m, 1H), 7.24 (m, 1H), 7.34 (m, 2H), 7.51 (m, 2H), 7.77 (m, 1H);
MS (FAB, pos. matrix = Glycerin + m-NBA) : 450 (M + H)⁺;
TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

20 Example 11-0115

N¹-(4-azepan-1-ylpyrimidin-2-yl)-N²-methylethane-1,2-diamine

- 25 **[0954]** NMR (CDCl₃) : δ 1.54 (m, 4H), 1.74 (m, 4H), 2.71 (s, 3H), 3.24 (t, J = 5.20 Hz, 2H), 3.43 (m, 3H), 3.77 (m, 4H), 5.81 (d, J = 6.60 Hz, 1H), 7.54 (m, 1H), 7.65 (d, J = 6.60 Hz, 1H); MS (ESI, Pos. 20 V) : 250 (M + H)⁺, 125;
TLC : Rf 0.33 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0116

30 4-azepan-1-yl-N-[(3S)-1-(1,4-dioxaspiro[4.5]dec-8-yl)piperidin-3-yl]pyrimidin-2-amine

- [0955]** NMR (CDCl₃) : δ 1.53 (m, 8H), 1.72 (m, 12H), 2.30 (m, 2H), 2.55 (m, 2H), 2.95 (m, 1H), 3.58 (m, 4H), 3.92 (s, 4H), 4.42 (m, 1H), 5.09 (m, 1H), 5.76 (d, J = 6.00 Hz, 1H), 7.79 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 416 (M + H)⁺, 276, 208.5 (M + 2H)²⁺;
35 TLC : Rf 0.55 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0117

N-(1-benzylpiperidin-3-yl)-4-(1,4-oxazepan-4-yl)pyrimidin-2-amine

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- [0956]** NMR (CDCl₃) : δ 1.55 (m, 1H), 1.71 (m, 3H), 1.95 (m, 2H), 2.29 (m, 1H), 2.39 (m, 2H), 2.72 (m, 1H), 3.46 (d, J = 13.00 Hz, 1H), 3.52 (d, J = 13.00 Hz, 1H), 3.68 (m, 4H), 3.74 (m, 4H), 4.02 (m, 1H), 5.15 (m, 1H), 5.77 (d, J = 6.00 Hz, 1H), 7.28 (m, 5H), 7.83 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 368 (M + H)⁺, 278;
45 TLC : Rf 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0118

4-(1,4-oxazepan-4-yl)-N-piperidin-3-ylpyrimidin-2-amine

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- [0957]** NMR (CDCl₃) : δ 1.50 (m, 1H), 1.71 (m, 1H), 1.86 (m, 2H), 1.96 (m, 2H), 2.53 (m, 1H), 2.66 (m, 1H), 2.86 (m, 1H), 3.21 (m, 1H), 3.69 (m, 4H), 3.76 (m, 4H), 3.85 (m, 1H), 4.93 (m, 1H), 5.78 (d, J = 6.00 Hz, 1H), 7.82 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 278 (M + H)⁺, 139.5 (M + 2H)²⁺;
55 TLC : Rf 0.44 (CHCl₃ : MeOH : NH₄OH = 80 : 20 : 4).

Example 11-0119

ethyl 4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanecarboxylate

- 5 **[0958]** NMR (CDCl₃) : δ 1.24 (m, 3H), 1.52 (m, 11H), 1.72 (m, 7H), 1.89 (m, 1H), 2.03 (m, 2H), 2.21 (m, 2H), 2.40 (m, 1H), 2.51 (m, 1H), 2.91 (m, 1H), 3.55 (m, 4H), 3.97 (m, 1H), 4.11 (m, 2H), 5.17 (m, 1H), 5.74 (m, 1H), 7.76 (d, J = 6.20 Hz, 1H);
MS (ESI, Pos. 20 V) : 430 (M + H)⁺, 276, 215.5 (M + 2H)²⁺;
TLC : Rf 0.52 (AcOEt : MeOH : TEA = 20 : 2 : 1).

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Example 11-0120

4-(3 S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-yl-N-methoxy-N-methylcyclohexanecarboxamide

- 15 **[0959]** NMR (CDCl₃) : δ 1.51 (m, 9H), 1.71 (m, 6H), 1.90 (m, 4H), 2.24 (m, 1H), 2.37 (m, 2H), 2.54 (m, 2H), 2.79 (m, 1H), 2.91 (m, 1H), 3.13 (m, 3H), 3.56 (m, 4H), 3.65 (m, 3H), 3.98 (m, 1H), 5.10 (m, 1H), 5.73 (m, 1H), 7.75 (m, 1H);
MS (ESI, Pos. 20 V) : 445 (M + H)⁺, 384, 276, 223 (M + 2H)²⁺, 170;
TLC : Rf 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

20 Example 11-0121

4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanecarbaldehyde

- 25 **[0960]** NMR (CDCl₃) : δ 1.29 (m, 4H), 1.54 (m, 6H), 1.74 (m, 6H), 2.01 (m, 4H), 2.28 (m, 3H), 2.53 (m, 2H), 2.95 (m, 1H), 3.56 (m, 4H), 3.98 (m, 1H), 5.16 (m, 1H), 5.76 (d, J = 6.00 Hz, 1H), 7.78 (d, J = 6.00 Hz, 1H), 9.61 (s, 1H);
MS (ESI, Pos. 20 V) : 386 (M + H)⁺, 276, 193.5 (M + 2H)²⁺;
TLC : Rf 0.48 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0122

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(4-(3S)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexyl)(cyclohexyl)methanol

- 35 **[0961]** NMR (CDCl₃) : δ 1.23 (m, 6H), 1.54 (m, 12H), 1.75 (m, 12H), 2.04 (m, 2H), 2.25 (m, 2H), 2.40 (m, 2H), 2.56 (m, 2H), 2.97 (m, 1H), 3.55 (m, 4H), 4.02 (m, 1H), 5.39 (m, 1H), 5.76 (d, J = 6.20 Hz, 1H), 7.77 (m, 1H);
MS (ESI, Pos. 20 V) : 470 (M + H)⁺, 276, 235.5 (M + 2H)²⁺;
TLC : Rf 0.48 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 11-0123

40 4-azepan-1-yl-N-(1-benzylpyrrolidin-3-yl)pyrimidin-2-amine

- [0962]** NMR (DMSO-d₆, 363.1K) : δ 1.48 (m, 4H), 1.68 (m, 6H), 2.13 (m, 1H), 2.38 (dd, J = 9.3, 5.2 Hz, 1H), 2.58 (m, 1H), 2.84 (dd, J = 9.3, 6.9 Hz, 1H), 3.53 (t, J = 6.00 Hz, 4H), 3.59 (s, 2H), 4.27 (m, 1H), 5.83 (d, J = 6.04 Hz, 1H), 5.94 (m, 1H), 7.24 (m, 5H), 7.71 (d, J = 6.04 Hz, 1H);
45 MS (ESI, Pos. 20 V) : 352 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.00;
TLC : Rf 0.16 (CH₃Cl : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0124

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1-[2-(4-phenylpiperazin-1-yl)pyrimidin-4-yl]azepane

- [0963]** NMR (DMSO-d₆, 363.1K) : δ 1.52 (m, 4H), 1.72 (m, 4H), 3.20 (t, J = 5.10 Hz, 4H), 3.60 (t, J = 6.00 Hz, 4H), 3.83 (t, J = 5.10 Hz, 4H), 5.93 (d, J = 6.04 Hz, 1H), 6.79 (t, J = 7.3 Hz, 1H), 6.97 (d, J = 7.7 Hz, 2H), 7.23 (m, 2H), 7.86 (d, J = 6.04 Hz, 1H);
55 MS (ESI, Pos. 20 V) : 338 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.40;
TLC : Rf 0.18 (Hexane : AcOEt = 3 : 1).

Example 11-0125

1-[2-(4-methylpiperazin-1-yl)pyrimidin-4-yl]azepane

- 5 **[0964]** NMR (DMSO- d_6 , 363.1K) : δ 1.49 (m, 4H), 1.71 (m, 4H), 2.20 (s, 3H), 2.32 (t, J = 5.10 Hz, 4H), 3.56 (t, J = 6.00 Hz, 4H), 3.65 (t, J = 5.10 Hz, 4H), 5.88 (d, J = 6.0 Hz, 1H), 7.80 (d, J = 6.0 Hz, 1H);
 MS (ESI, Pos. 20 V) : 276 (M + H)⁺;
 HPLC condition : A; HPLC retention time (min) : 2.76;
 TLC : Rf 0.18 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

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Example 11-0126

1-[2-(4-benzylpiperazin-1-yl)pyrimidin-4-yl]azepane

- 15 **[0965]** NMR (DMSO- d_6 , 363.1K) : δ 1.48 (m, 4H), 1.68 (m, 4H), 2.40 (t, J = 5.10 Hz, 4H), 3.50 (s, 2H), 3.54 (t, J = 5.70 Hz, 4H), 3.65 (t, J = 5.10 Hz, 4H), 5.87 (d, J = 6.0 Hz, 1H), 7.26 (m, 5H), 7.79 (d, J = 6.0 Hz, 1H);
 MS (ESI, Pos. 20 V) : 352 (M + H)⁺;
 HPLC condition : A; HPLC retention time (min) : 2.96;
 TLC : Rf 0.41 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

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Example 11-0127

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-ylacetic acid

25 Example 11-0128

4-azepan-1-yl-N-[1-(cyclopropylmethyl)pyrrolidin-3-yl]pyrimidin-2-amine

Example 11-0129

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4-azepan-1-yl-N-1-[3-(methylsulfonyl)propyl]pyrrolidin-3-ylpyrimidin-2-amine

Example 11-0130

35 4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-ylbutyric acid

Example 11-0131

4-azepan-1-yl-N-[1-(2,6-dimethylhept-5-enyl)pyrrolidin-3-yl]pyrimidin-2-amine

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Example 11-0132

4-azepan-1-yl-N-[1-(quinolin-2-ylmethyl)pyrrolidin-3-yl]pyrimidin-2-amine

45 Example 11-0133

2-(acetylamino)-1-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl-1,2-dideoxy-D-galactitol

Example 11-0134

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4-azepan-1-yl-N-(1-neopentylpyrrolidin-3-yl)pyrimidin-2-amine

Example 11-0135

55 4-azepan-1-yl-N-1-[(2E)-3-(2-furyl)prop-2-enyl]pyrrolidin-3-ylpyrimidin-2-amine

[0966] MS (ESI, Pos.20V) : 368 (M + H)⁺;
 HPLC condition : B; HPLC retention time (min) : 3.97.

Example 11-0136

4-azepan-1-yl-N-1-[4-(octyloxy)benzyl]pyrrolidin-3-ylpyrimidin-2-amine

5 Example 11-0137

4-azepan-1-yl-N-(1-isobutylpyrrolidin-3-yl)pyrimidin-2-amine

10 **[0967]** MS (ESI, Pos.20V): 318 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 4.15.

Example 11-0138

15 4-azepan-1-yl-N-(1-propylpyrrolidin-3-yl)pyrimidin-2-amine

Example 11-0139

4-azepan-1-yl-N-1-[(2E)-dec-2-enyl]pyrrolidin-3-ylpyrimidin-2-amine

20 Example 11-0140

4-azepan-1-yl-N-1-[2-(benzyloxy)ethyl]pyrrolidin-3-ylpyrimidin-2-amine

Example 11-0141

25 4-4-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylbutyric acid

Example 11-0142

30 2-(acetylamino)-1-4-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-yl-1,2-dideoxy-D-galactitol

Example 11-0143

35 4-azepan-1-yl-N-(1-benzylpiperidin-4-yl)pyrimidin-2-amine

[0968] MS (ESI, Pos.20V) : 731 (2M + H)⁺, 366 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 4.11.

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Example 11-0144

4-azepan-1-yl-N-1-[(2E)-3-(2-furyl)prop-2-enyl]piperidin-4-ylpyrimidin-2-amine

5 Example 1-0145

4-azepan-1-yl-N-[1-(2-ethylhexyl)piperidin-4-yl]pyrimidin-2-amine

Example 11-0146

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2-4-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylethanol

Example 11-0147

15 4-azepan-1-yl-N-1-[(2E)-dec-2-enyl]piperidin-4-ylpyrimidin-2-amine

Example 11-0148

4-azepan-1-yl-N-[1-(4-[(2E)-4-methylpent-2-enyl]cyclohex-3-en-1-ylmethyl)piperidin-4-yl]pyrimidin-2-amine

20

Example 11-0149

5-methyl-3-phenyl-N-2-[(4-pyrrolidin-1-ylpyrimidin-2-yl)amino]ethylisoxazole-4-carboxamide

25 **[0969]** MS (ESI, Pos.20V) : 785 (2M + H)⁺, 393 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0150

30 N-2-[(4-piperidin-1-ylpyrimidin-2-yl)amino]ethylbenzamide

[0970] MS (ESI, Pos.20V) : 326 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

35 Example 11-0151

5-methyl-3-phenyl-N-2-[(4-piperidin-1-ylpyrimidin-2-yl)amino]ethylisoxazole-4-carboxamide

40 **[0971]** MS (ESI, Pos.20V) : 813 (2M + H)⁺, 407 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0152

N-2-[(4-azepan-1-ylpyrimidin-2-yl)amino]ethyl-2,2-diphenylacetamide

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[0972] MS (ESI, Pos.20V) : 859 (2M + H)⁺, 430 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.49.

Example 11-0153

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N-2-[(4-azepan-1-ylpyrimidin-2-yl)amino]ethyl-5-methyl-3-phenylisoxazole-4-carboxamide

[0973] MS (ESI, Pos.20V) : 841 (2M + H)⁺, 421 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.34.

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Example 11-0154

N-2-[(4-azepan-1-yl)pyrimidin-2-yl]amino]ethylacrylamide

5 **[0974]** MS (ESI, Pos.20V) : 290 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0155

10 N-2-[(4-azepan-1-yl)pyrimidin-2-yl]amino]ethylcyclohexanecarboxamide

[0975] MS (ESI, Pos.20V) : 346 (M + H)⁺, 267;
HPLC condition : A; HPLC retention time (min) : 3.31.

15 Example 11-0156

N-2-[(4-azepan-1-yl)pyrimidin-2-yl]amino]ethyl-3-cyclopentylpropanamide

20 **[0976]** MS (ESI, Pos.20V) : 719 (2M + H)⁺, 360 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

Example 11-0157

N-(2-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]aminoethyl)-2,2-diphenylacetamide

25 **[0977]** MS (ESI, Pos.20V) : 927 (2M + H)⁺, 464 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.56.

Example 11-0158

30 N-(2-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]aminoethyl)-5-methyl-3-phenylisoxazole-4-carboxamide

[0978] MS (ESI, Pos.20V) : 455 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

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Example 11-0159

N¹-(4-azepan-1-yl)pyrimidin-2-yl)-N²-methyl-N²-(quinolin-2-ylmethyl)ethane-1,2-diamine

5 Example 11-0160

butyl N-2-[(4-azepan-1-yl)pyrimidin-2-yl]amino]ethyl-N-methylglycinate

Example 11-0161

10

N¹-(4-azepan-1-yl)pyrimidin-2-yl)-N²-[(2E)-3,7-dimethyloct-2,6-dienyl]-N²-methylethane-1,2-diamine

Example 11-0162

15 butyl (2-[(4-azepan-1-yl)pyrimidin-2-yl]amino)methylpyrrolidin-1-yl)acetate

Example 11-0163

ethyl N-2-[(4-azepan-1-yl)pyrimidin-2-yl]amino]ethyl-N-methylglycinate

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Example 11-0164

ethyl (2-[(4-azepan-1-yl)pyrimidin-2-yl]amino)methylpyrrolidin-1-yl)acetate

25 Example 11-0165

N-(4-pyrrolidin-1-yl)pyrimidin-2-yl)ethane-1,2-diamine

[0979] MS (ESI, Pos.20V) : 208 (M + H);

30 HPLC condition : B; HPLC retention time (min) : 2.86.

Example 11-0166

1-2-[(2-aminoethyl)amino]pyrimidin-4-ylpyrrolidin-3-ol

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Example 11-0167

N-[4-(4-phenylpiperazin-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

40 **[0980]** MS (ESI, Pos.20V) : 299 (M + H);

HPLC condition : A; HPLC retention time (min) : 2.94.

Example 11-0168

45 N-[4-(4-methylpiperazin-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

[0981] MS (ESI, Pos.20V) : 237 (M + H);

HPLC condition : B; HPLC retention time (min) : 2.59.

50 Example 11-0169

N-(4-morpholin-4-yl)pyrimidin-2-yl)ethane-1,2-diamine

Example 11-0170

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N-(4-thiomorpholin-4-yl)pyrimidin-2-yl)ethane-1,2-diamine

[0982] MS (ESI, Pos.20V) : 240 (M + H);

HPLC condition : B; HPLC retention time (min) : 2.89.

Example 11-0171

5 2-(1-2-[(2-aminoethyl)amino]pyrimidin-4-yl)piperidin-2-yl)ethanol

[0983] MS (ESI, Pos.20V) : 266 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.73.

10 Example 11-0172

(1-2-[(2-aminoethyl)amino]pyrimidin-4-yl)piperidin-3-yl)methanol

[0984] MS (ESI, Pos.20V) : 252 (M + H);
15 HPLC condition : B; HPLC retention time (min) : 2.74.

Example 11-0173

20 1-2-[(2-aminoethyl)amino]pyrimidin-4-yl)piperidin-4-ol

[0985] MS (ESI, Pos.20V) : 238 (M + H);
HPLC condition : B; HPLC retention time (min) : 2.41.

Example 11-0174

25 N-[4-(4-phenyl-3,6-dihydropyridin-1(2H)-yl)pyrimidin-2-yl]ethane-1,2-diamine

[0986] MS (ESI, Pos.20V) : 296 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.08.

30 Example 11-0175

2-(1-2-[(2-aminoethyl)amino]pyrimidin-4-yl)piperidin-4-yl)ethanol

35 **[0987]** MS (ESI, Pos.20V) : 266 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.63.

Example 11-0176

40 1-2-[(2-aminoethyl)amino]pyrimidin-4-yl)piperidin-3-ol

[0988] MS (ESI, Pos.20V) : 238 (M + H);
HPLC condition : B; HPLC retention time (min) : 2.57.

45 Example 11-0177

N-[4-(3,6-dihydropyridin-1(2H)-yl)pyrimidin-2-yl]ethane-1,2-diamine

[0989] MS (ESI, Pos.20V) : 220 (M + H);
50 HPLC condition : A; HPLC retention time (min) : 2.70.

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Example 11-0178

4-2-[(2-aminoethyl)amino]pyrimidin-4-ylpiperazine-1-carboaldehyde

5 Example 11-0179

2-(4-2-[(2-aminoethyl)amino]pyrimidin-4-ylpiperazin-1-yl)ethanol

Example 11-0180

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N-[4-(3,5-dimethylpiperidin-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

[0990] MS (ESI, Pos.20V) : 250 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.98.

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Example 11-0181

N-(4-azepan-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

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[0991] MS (ESI, Pos.20V) : 236 (M + H);
HPLC condition : A; HPLC retention time (min); 2.84.

Example 11-0182

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N-[4-(4-methyl-1,4-diazepan-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

[0992] MS (ESI, Pos.20V) : 261 (M + H);
HPLC condition : B; HPLC retention time (min) : 2.68.

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Example 11-0183

N-[4-(2,6-dimethylmorpholin-4-yl)pyrimidin-2-yl]ethane-1,2-diamine

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[0993] MS (ESI, Pos.20V) : 252 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.68.

Example 11-0184

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N-4-[(2S)-2-(methoxymethyl)pyrrolidin-1-yl]pyrimidin-2-ylethane-1,2-diamine

[0994] MS (ESI, Pos.20V) : 252 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.71.

Example 11-0185

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ethyl 1-2-[(2-aminoethyl)amino]pyrimidin-4-ylpiperidine-3-carboxylate

[0995] MS (ESI, Pos.20V) : 294 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.85.

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Example 11-0186

ethyl 1-2-[(2-aminoethyl)amino]pyrimidin-4-ylpiperidine-4-carboxylate

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[0996] MS (ESI, Pos.20V) : 294 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.85.

Example 11-0187

N-[4-(4-phenylpiperidin-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

5 **[0997]** MS (ESI, Pos.20V) : 298 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.08.

Example 11-0188

10 N-[4-(4-benzylpiperidin-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

[0998] MS (ESI, Pos.20V) : 312 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.16.

15 Example 11-0189

N-[4-(1,4'-bipiperidin-1'-yl)pyrimidin-2-yl]ethane-1,2-diamine

20 **[0999]** MS (ESI, Pos.20V) : 305 (M + H);
HPLC condition : B; HPLC retention time (min) : 3.14.

Example 11-0190

25 N-4-[4-(4-methoxyphenyl)piperazin-1-yl]pyrimidin-2-ylethane-1,2-diamine

[1000] MS (ESI, Pos.20V) : 329 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.81.

Example 11-0191

30 N-(4-4-[4-(trifluoromethyl)phenyl]piperazin-1-yl)pyrimidin-2-yl)ethane-1,2-diamine

[1001] MS (ESI, Pos.20V) : 367 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.20.

35 Example 11-0192

N-[4-(4-cyclohexylpiperazin-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

40 **[1002]** MS (ESI, Pos.20V) : 305 (M + H);
HPLC condition : B; HPLC retention time (min) : 3.29.

Example 11-0193

45 N-[4-(4-benzylpiperazin-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

[1003] MS (ESI, Pos.20V) : 313 (M + H);
HPLC condition : B; HPLC retention time (min) : 3.27.

50 Example 11-0194

N-4-[4-(2,4-dimethylphenyl)piperazin-1-yl]pyrimidin-2-ylethane-1,2-diamine

55 **[1004]** MS (ESI, Pos.20V) : 327 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0195

N-(4-4-[(2E)-3-phenylprop-2-enyl]piperazin-1-yl)pyrimidin-2-ylethane-1,2-diamine

5 [1005] MS (ESI, Pos.20V) : 339 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.86.

Example 11-0196

10 N-4-[4-(2-oxo-2-pyrrolidin-1-ylethyl)piperazin-1-yl]pyrimidin-2-ylethane-1,2-diamine

[1006] MS (ESI, Pos.20V) : 334 (M + H);
HPLC condition : B; HPLC retention time (min) : 2.77.

15 Example 11-0197

ethyl 4-2-[(2-aminoethyl)amino]pyrimidin-4-ylpiperazine-1-carboxylate

20 [1007] MS (ESI, Pos.20V) : 295 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.78.

Example 11-0198

25 N-(4-4-[5-(trifluoromethyl)pyridin-2-yl]-1,4-diazepan-1-yl)pyrimidin-2-ylethane-1,2-diamine

[1008] MS (ESI, Pos.20V) : 382 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0199

30 N-(1-2-[(2-aminoethyl)amino]pyrimidin-4-ylpyrrolidin-3-yl)-N-methylacetamide

[1009] MS (ESI, Pos.20V) : 279 (M + H);
HPLC condition : B; HPLC retention time (min) : 2.57.

35 Example 11-0200

N-[4-(2-pyridin-2-ylazepan-1-yl)pyrimidin-2-yl]ethane-1,2-diamine

40 [1010] MS (ESI, Pos.20V) : 313 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.74.

Example 11-0201

45 (3R)-N-(4-azepan-1-yl)pyrimidin-2-yl-1-benzylazepan-3-amine

[1011] NMR (DMSO-d₆) : 1.36 (m, 5H), 1.59 (m, 8H), 1.82 (m, 1H), 2.56 (m, 3H), 2.80 (m, 1H), 3.48 (m, 4H), 3.63 (s, 2H), 3.95 (m, 1H), 5.80 (d, J = 5.90 Hz, 1H), 6.08 (m, 1H), 7.24 (m, 5H), 7.68 (d, J = 5.90 Hz, 1H);
MS (ESI, Pos. 20 V) : 380 (M + H)⁺, 290, 193;
50 HPLC condition : A; HPLC retention time (min) : 3.03;
TLC : R_f 0.55 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 11-0202

55 (3R)-N-(4-azepan-1-yl)pyrimidin-2-ylazepan-3-amine

[1012] NMR (DMSO-d₆) : δ 1.44 (m, 5H), 1.61 (m, 9H), 2.60 (dd, J = 13.50, 7.10 Hz, 1H), 2.72 (t, J = 6.00 Hz, 2H), 2.89 (dd, J = 13.50, 4.30 Hz, 1H), 3.56 (m, 4H), 3.87 (m, 1H), 5.81 (d, J = 6.00 Hz, 1H), 6.09 (m, 1H), 7.70 (d, J = 6.00

Hz, 1H);
 MS (ESI, Pos. 20 V) : 290 (M + H)⁺, 145.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 2.92;
 TLC : R_f 0.20 (CHCl₃ : MeOH : NH₄OH = 80 : 10: 1).

Example 11-0203

(3 S)-N-(4-azepan-1-ylpyrimidin-2-yl)-1-(pyridin-2-ylmethyl)azepan-3-amine

Example 11-0204

(3R)-N-(4-azepan-1-ylpyrimidin-2-yl)-1-(pyridin-2-ylmethyl)azepan-3-amine

Example 11-0205

(3R)-N-(4-azepan-1-ylpyrimidin-2-yl)-1-(2-ethylbutyl)azepan-3-amine

[1013] MS (ESI, Pos. 20 V) : 374 (M + H)⁺, 290, 187.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0206

(3R)-N-(4-azepan-1-ylpyrimidin-2-yl)-1-isobutylazepan-3-amine

[1014] MS (ESI, Pos. 20 V) : 346 (M + H)⁺, 290, 173.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0207

(3R)-N-(4-azepan-1-ylpyrimidin-2-yl)-1-cyclohexylazepan-3-amine

[1015] MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 346, 290, 186.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0208

4-azepan-1-yl-N-[(3R)-1-benzylpiperidin-3-yl]pyrimidin-2-amine

[1016] MS (ESI, Pos.20V) : 366 (M + H)⁺, 276;
 HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0209

4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)piperidin-3-yl]pyrimidin-2-amine

[1017] MS (ESI, Pos.20V) : 367 (M + H)⁺, 184 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 2.92.

Example 11-0210

4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)piperidin-3-yl]pyrimidin-2-amine

[1018] MS (ESI, Pos.20V) : 360 (M + H)⁺, 276, 180.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0211

4-azepan-1-yl-N-[(3R)-1-isobutylpiperidin-3-yl]pyrimidin-2-amine

5 [1019] MS (ESI, Pos.20V) : 332 (M + H)⁺, 276, 166.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0212

10 4-azepan-1-yl-N-[(3R)-1-cyclohexylpiperidin-3-yl]pyrimidin-2-amine

[1020] MS (ESI, Pos.20V) : 358 (M + H)⁺, 276, 179.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

15 Example 11-0213

4-azepan-1-yl-N-[1-(3,3-dimethylcyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

20 [1021] MS (ESI, Pos.20V) : 372 (M + H)⁺, 262, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0214

25 4-azepan-1-yl-N-[1-(2-methoxy-1-methylethyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1022] MS (ESI, Pos.20V) : 334 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.92.

Example 11-0215

30 4-azepan-1-yl-N-(1-cyclobutylpyrrolidin-3-yl)pyrimidin-2-amine

[1023] MS (ESI, Pos.20V) : 316 (M + H)⁺, 262, 193;
HPLC condition : A; HPLC retention time (min) : 2.94.

35 Example 11-0216

4-azepan-1-yl-N-(1-tetrahydro-2H-thiopyran-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

40 [1024] MS (ESI, Pos.20V) : 362 (M + H)⁺, 262, 193;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0217

45 4-azepan-1-yl-N-(1-cyclopentylpyrrolidin-3-yl)pyrimidin-2-amine

[1025] MS (ESI, Pos.20V) : 330 (M + H)⁺, 262, 193, 165.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

50 Example 11-0218

4-azepan-1-yl-N-[1-(1-methylbutyl)pyrrolidin-3-yl]pyrimidin-2-amine

55 [1026] MS (ESI, Pos.20V) : 332 (M + H)⁺, 262, 166.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0219

4-azepan-1-yl-N-[1-(1,2-dimethylpropyl)pyrrolidin-3-yl]pyrimidin-2-amine

5 **[1027]** MS (ESI, Pos.20V) : 332 (M + H)⁺, 262, 193;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0220

10 4-azepan-1-yl-N-[1-(2,2-dimethoxy-1-methylethyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1028] MS (ESI, Pos.20V) : 364 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.96.

15 Example 11-0221

4-azepan-1-yl-N-[1-(1,3-dimethylbutyl)pyrrolidin-3-yl]pyrimidin-2-amine

20 **[1029]** MS (ESI, Pos.20V) : 346 (M + H)⁺, 262, 173.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0222

25 4-azepan-1-yl-N-[1-(1-methylpentyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1030] MS (ESI, Pos.20V) : 346 (M + H)⁺, 262, 173.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0223

30 4-azepan-1-yl-N-[1-(3,3-dimethoxy-1-methylpropyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1031] MS (ESI, Pos.20V) : 378 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

35 Example 11-0224

4-azepan-1-yl-N-[1-(1-methylpent-4-enyl)pyrrolidin-3-yl]pyrimidin-2-amine

40 **[1032]** MS (ESI, Pos.20V) : 344 (M + H)⁺, 262, 172.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0225

45 4-azepan-1-yl-N-(1-cyclohex-2-en-1-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1033] MS (ESI, Pos.20V) : 342 (M + H)⁺, 262, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

50 Example 11-0226

4-azepan-1-yl-N-[1-(2-methylcyclopentyl)pyrrolidin-3-yl]pyrimidin-2-amine

55 **[1034]** MS (ESI, Pos.20V) : 344 (M + H)⁺, 262, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0227

4-azepan-1-yl-N-[1-(3-methylcyclopentyl)pyrrolidin-3-yl]pyrimidin-2-amine

5 [1035] MS (ESI, Pos.20V) : 344 (M + H)⁺, 262, 172.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0228

10 4-azepan-1-yl-N-[1-(1-ethylbutyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1036] MS (ESI, Pos.20V) : 346 (M + H)⁺, 262, 173.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

15 Example 11-0229

4-azepan-1-yl-N-[1-(2-methylcyclopent-2-en-1-yl)pyrrolidin-3-yl]pyrimidin-2-amine

20 [1037] MS (ESI, Pos.20V) : 342 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0230

25 4-azepan-1-yl-N-[1-(1-methylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1038] MS (ESI, Pos.20V) : 359 (M + H)⁺, 262, 180 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.83.

Example 11-0231

30 4-azepan-1-yl-N-[1-(1-methylhexyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1039] MS (ESI, Pos.20V) : 360 (M + H)⁺, 262, 180.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

35 Example 11-0232

4-azepan-1-yl-N-[1-(1-ethylpentyl)pyrrolidin-3-yl]pyrimidin-2-amine

40 [1040] MS (ESI, Pos.20V) : 360 (M + H)⁺, 262, 180.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0233

45 4-azepan-1-yl-N-[1-(2-methylcyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1041] MS (ESI, Pos.20V) : 358 (M + H)⁺, 262, 179.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

50 Example 11-0234

4-azepan-1-yl-N-[1-(3-methylcyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

55 [1042] MS (ESI, Pos.20V) : 358 (M + H)⁺, 262, 179.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0235

4-azepan-1-yl-N-[1-(4-methylcyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

5 **[1043]** MS (ESI, Pos.20V) : 358 (M + H)⁺, 262, 179.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0236

10 4-azepan-1-yl-N-[1-(3,4-dimethylcyclopentyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1044] MS (ESI, Pos.20V) : 358 (M + H)⁺, 262, 179.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

15 Example 11-0237

4-azepan-1-yl-N-[1-(2-methoxycyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

20 **[1045]** MS (ESI, Pos.20V) : 374 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0238

25 4-azepan-1-yl-N-[1-(1-propylbutyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1046] MS (ESI, Pos.20V) : 360 (M + H)⁺, 262, 180.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0239

30 4-azepan-1-yl-N-(1-cycloheptylpyrrolidin-3-yl)pyrimidin-2-amine

[1047] MS (ESI, Pos.20V) : 358 (M + H)⁺, 262, 179.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

35 Example 11-0240

4-azepan-1-yl-N-(1-tricyclo[2.2.1.0^{2,6}]hept-3-ylpyrrolidin-3-yl)pyrimidin-2-amine

40 **[1048]** MS (ESI, Pos.20V) : 354 (M + H)⁺, 262, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0241

45 4-azepan-1-yl-N-[1-(1-isopropylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1049] MS (ESI, Pos.20V) : 387 (M + H)⁺, 262, 194 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.85.

50 Example 11-0242

4-azepan-1-yl-N-[1-(1-methylheptyl)pyrrolidin-3-yl]pyrimidin-2-amine

55 **[1050]** MS (ESI, Pos.20V) : 374 (M + H)⁺, 262, 187.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-0243

4-azepan-1-yl-N-[1-(1-cyclohexylethyl)pyrrolidin-3-yl]pyrimidin-2-amine

5 **[1051]** MS (ESI, Pos.20V) : 372 (M + H)⁺, 262, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0244

10 4-azepan-1-yl-N-[1-(1-propylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1052] MS (ESI, Pos.20V) : 387 (M + H)⁺, 262, 194 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.87.

15 Example 11-0245

4-azepan-1-yl-N-[1-(1,4-dioxaspiro[4.5]dec-8-yl)pyrrolidin-3-yl]pyrimidin-2-amine

20 **[1053]** MS (ESI, Pos.20V) : 402 (M + H)⁺, 262, 193;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0246

25 4-azepan-1-yl-N-(1-cyclooctylpyrrolidin-3-yl)pyrimidin-2-amine

[1054] MS (ESI, Pos.20V) : 372 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0247

30 4-azepan-1-yl-N-[1-(3,5-dimethylcyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1055] MS (ESI, Pos.20V) : 372 (M + H)⁺, 262, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

35 Example 11-0248

4-azepan-1-yl-N-1-[3-(diethylamino)-1-methylpropyl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1056]** MS (ESI, Pos.20V) : 389 (M + H)⁺, 262, 195 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.87.

Example 11-0249

45 4-azepan-1-yl-N-[1-(1-ethylhexyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1057] MS (ESI, Pos.20V) : 374 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.27.

50 Example 11-0250

4-azepan-1-yl-N-[1-(2,3-dihydro-1H-inden-2-yl)pyrrolidin-3-yl]pyrimidin-2-amine

55 **[1058]** MS (ESI, Pos.20V) : 378 (M + H)⁺, 262, 189.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0251

4-azepan-1-yl-N-1-[4-(trifluoromethyl)cyclohexyl]pyrrolidin-3-ylpyrimidin-2-amine

5 **[1059]** MS (ESI, Pos.20V) : 412 (M + H)⁺, 262, 206.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0252

10 4-azepan-1-yl-N-[1-(2-propylcyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1060] MS (ESI, Pos.20V) : 386 (M + H)⁺, 262, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

15 Example 11-0253

4-azepan-1-yl-N-[1-(1-cyclohexylpropyl)pyrrolidin-3-yl]pyrimidin-2-amine

20 **[1061]** MS (ESI, Pos.20V) : 386 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0254

25 4-azepan-1-yl-N-[1-(1-butylpentyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1062] MS (ESI, Pos.20V) : 388 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.33.

Example 11-0255

30 4-azepan-1-yl-N-[1-(1-methyl-3-phenylpropyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1063] MS (ESI, Pos.20V) : 394 (M + H)⁺, 262, 197.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

35 Example 11-0256

4-azepan-1-yl-N-(1-decahydronaphthalen-2-yl)pyrrolidin-3-ylpyrimidin-2-amine

40 **[1064]** MS (ESI, Pos.20V) : 398 (M + H)⁺, 262, 199.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0257

45 4-azepan-1-yl-N-(1-cyclodecylpyrrolidin-3-yl)pyrimidin-2-amine

[1065] MS (ESI, Pos.20V) : 400 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.31.

50 Example 11-0258

4-azepan-1-yl-N-[1-(1,2,3,4-tetrahydronaphthalen-2-yl)pyrrolidin-3-yl]pyrimidin-2-amine

55 **[1066]** MS (ESI, Pos.20V) : 392 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0259

4-azepan-1-yl-N-[1-(1-pentylhexyl)pyrrolidin-3-yl]pyrimidin-2-amine

5 **[1067]** MS (ESI, Pos.20V) : 416 (M + H)⁺, 262, 208.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.51.

Example 11-0260

10 4-azepan-1-yl-N-[1-(6-methoxy-1,2,3,4-tetrahydronaphthalen-2-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1068] MS (ESI, Pos.20V) : 422 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.16.

15 Example 11-0261

4-azepan-1-yl-N-[1-(7-methoxy-1,2,3,4-tetrahydronaphthalen-2-yl)pyrrolidin-3-yl]pyrimidin-2-amine

20 **[1069]** MS (ESI, Pos.20V) : 422 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0262

25 4-azepan-1-yl-N-[1-(1-benzylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1070] MS (ESI, Pos.20V) : 435 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0263

30 4-azepan-1-yl-N-(1-cyclododecylpyrrolidin-3-yl)pyrimidin-2-amine

[1071] MS (ESI, Pos.20V) : 428 (M + H)⁺, 262, 214.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.45.

35 Example 11-0264

4-azepan-1-yl-N-[1-(4-phenylcyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

40 **[1072]** MS (ESI, Pos.20V) : 420 (M + H)⁺, 262, 210.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0265

45 4-azepan-1-yl-N-[1-(2-phenylcyclohexyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1073] MS (ESI, Pos.20V) : 420 (M + H)⁺, 262, 210.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

50 Example 11-0266

4-azepan-1-yl-N-1-[1-(2-phenylethyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 **[1074]** MS (ESI, Pos.20V) : 449 (M + H)⁺, 262, 225 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0267

4-azepan-1-yl-N-[1-(1-methyl-2,2-diphenylethyl)pyrrolidin-3-yl]pyrimidin-2-amine

5 [1075] MS (ESI, Pos.20V): 456 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0268

10 4-azepan-1-yl-N-[1-(1-benzyl-2-phenylethyl)pyrrolidin-3-yl]pyrimidin-2-amine

[1076] MS (ESI, Pos.20V): 456 (M + H)⁺, 262;
HPLC condition: A; HPLC retention time (min) : 3.36.

15 Example 11-0269

4-azepan-1-yl-N-(1-tetrahydrothien-3-ylpiperidin-3-yl)pyrimidin-2-amine

20 [1077] MS (ESI, Pos.20V) : 362 (M + H)⁺, 276, 193;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0270

25 4-azepan-1-yl-N-[1-(3,3-dimethylcyclohexyl)piperidin-3-yl]pyrimidin-2-amine

[1078] MS (ESI, Pos.20V) : 386 (M + H)⁺, 276, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0271

30 4-azepan-1-yl-N-(1-cyclobutylpiperidin-3-yl)pyrimidin-2-amine

[1079] MS (ESI, Pos.20V) : 330 (M + H)⁺, 276, 193, 165.5 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 2.94.

35 Example 11-0272

4-azepan-1-yl-N-(1-tetrahydro-2H-thiopyran-4-ylpiperidin-3-yl)pyrimidin-2-amine

40 [1080] MS (ESI, Pos.20V) : 376 (M + H)⁺, 276, 188.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0273

45 4-azepan-1-yl-N-(1-cyclopentylpiperidin-3-yl)pyrimidin-2-amine

[1081] MS (ESI, Pos.20V) : 344 (M + H)⁺, 276, 172.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

50 Example 11-0274

4-azepan-1-yl-N-[1-(1-methylbutyl)piperidin-3-yl]pyrimidin-2-amine

55 [1082] MS (ESI, Pos.20V) : 346 (M + H)⁺, 276, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0275

4-azepan-1-yl-N-[1-(3-methylcyclopentyl)piperidin-3-yl]pyrimidin-2-amine

5 [1083] MS (ESI, Pos.20V) : 358 (M + H)⁺, 276, 179.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0276

10 4-azepan-1-yl-N-[1-(1-ethylbutyl)piperidin-3-yl]pyrimidin-2-amine

[1084] MS (ESI, Pos.20V) : 360 (M + H)⁺, 318;
HPLC condition: A; HPLC retention time (min) : 3.09.

15 Example 11-0277

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-methyl-1,4'-bipiperidin-3-amine

20 [1085] MS (ESI, Pos.20V) : 373 (M + H)⁺, 276, 187 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min): 2.83.

Example 11-0278

25 4-azepan-1-yl-N-(1-cyclohept-2-en-1-yl)piperidin-3-yl]pyrimidin-2-amine

[1086] MS (ESI, Pos.20V) : 370 (M + H)⁺, 276;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0279

30 4-azepan-1-yl-N-[1-(1-methylhexyl)piperidin-3-yl]pyrimidin-2-amine

[1087] MS (ESI, Pos.20V) : 374 (M + H)⁺, 276, 187.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

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Example 11-0280

4-azepan-1-yl-N-[1-(3-methylcyclohexyl)piperidin-3-yl]pyrimidin-2-amine

40 [1088] MS (ESI, Pos.20V) : 372 (M + H)⁺, 276, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0281

45 4-azepan-1-yl-N-[1-(3,4-dimethylcyclopentyl)piperidin-3-yl]pyrimidin-2-amine

[1089] MS (ESI, Pos.20V) : 372 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

50 Example 11-0282

4-azepan-1-yl-N-(1-cycloheptyl)piperidin-3-yl]pyrimidin-2-amine

55 [1090] MS (ESI, Pos.20V) : 372 (M + H)⁺, 276, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0283

4-azepan-1-yl-N-(1-tricyclo[2.2.1.0^{2,6}]hept-3-yl)piperidin-3-yl]pyrimidin-2-amine

5 **[1091]** MS (ESI, Pos.20V) : 368 (M + H)⁺, 276, 184.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0284

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-isopropyl-1,4'-bipiperidin-3-amine

[1092] MS (ESI, Pos.20V) : 401 (M + H)⁺, 276, 201 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.85.

15 Example 11-0285

4-azepan-1-yl-N-[1-(1-methylheptyl)piperidin-3-yl]pyrimidin-2-amine

20 **[1093]** MS (ESI, Pos.20V) : 388 (M + H)⁺, 276, 194.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0286

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-propyl-1,4'-bipiperidin-3-amine

25 **[1094]** MS (ESI, Pos.20V) : 401 (M + H)⁺, 276, 201 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.87.

Example 11-0287

30 4-azepan-1-yl-N-[1-(1,4-dioxaspiro[4.5]dec-8-yl)piperidin-3-yl]pyrimidin-2-amine

[1095] MS (ESI, Pos.20V) : 416 (M + H)⁺, 276, 208.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.96.

35 Example 11-0288

4-azepan-1-yl-N-(1-cyclooctylpiperidin-3-yl)pyrimidin-2-amine

40 **[1096]** MS (ESI, Pos.20V) : 386 (M + H)⁺, 276, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0289

45 4-azepan-1-yl-N-[1-(3,5-dimethylcyclohexyl)piperidin-3-yl]pyrimidin-2-amine

[1097] MS (ESI, Pos.20V) : 386 (M + H)⁺, 276, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

50 Example 11-0290

4-azepan-1-yl-N-1-[3-(diethylamino)-1-methylpropyl]piperidin-3-ylpyrimidin-2-amine

55 **[1098]** MS (ESI, Pos.20V) : 403 (M + H)⁺, 276, 202 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.87.

Example 11-0291

4-azepan-1-yl-N-[1-(1-ethylhexyl)piperidin-3-yl]pyrimidin-2-amine

5 [1099] MS (ESI, Pos.20V): 388 (M + H)⁺, 276, 194.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0292

10 4-azepan-1-yl-N-[1-(2,3-dihydro-1H-inden-2-yl)piperidin-3-yl]pyrimidin-2-amine

[1100] MS (ESI, Pos.20V) : 392 (M + H)⁺, 276, 196.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

15 Example 11-0293

4-azepan-1-yl-N-1-[4-(trifluoromethyl)cyclohexyl]piperidin-3-ylpyrimidin-2-amine

20 [1101] MS (ESI, Pos.20V) : 426 (M + H)⁺, 276, 213.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0294

25 4-azepan-1-yl-N-[1-(1-methyl-3-phenylpropyl)piperidin-3-yl]pyrimidin-2-amine

[1102] MS (ESI, Pos.20V) : 408 (M + H)⁺, 275, 204.5 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.20.

Example 11-0295

30 4-azepan-1-yl-N-(1-decahydronaphthalen-2-yl)piperidin-3-ylpyrimidin-2-amine

[1103] MS (ESI, Pos.20V) : 412 (M + H)⁺, 276, 206.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

35 Example 11-0296

4-azepan-1-yl-N-[1-(1,2,3,4-tetrahydronaphthalen-2-yl)piperidin-3-yl]pyrimidin-2-amine

40 [1104] MS (ESI, Pos.20V): 406 (M + H)⁺, 276;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0297

45 4-azepan-1-yl-N-[1-(1-pentylhexyl)piperidin-3-yl]pyrimidin-2-amine

[1105] MS (ESI, Pos.20V) : 430 (M + H)⁺, 276, 215.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.49.

50 Example 11-0298

4-azepan-1-yl-N-[1-(7-methoxy-1,2,3,4-tetrahydronaphthalen-2-yl)piperidin-3-yl]pyrimidin-2-amine

55 [1106] MS (ESI, Pos.20V) : 436 (M + H)⁺, 276;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0299

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-benzyl-1,4'-bipiperidin-3-amine

5 [1107] MS (ESI, Pos.20V) : 449 (M + H)⁺, 276, 225 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0300

10 4-azepan-1-yl-N-[1-(4-phenylcyclohexyl)piperidin-3-yl]pyrimidin-2-amine

[1108] MS (ESI, Pos.20V) : 434 (M + H)⁺, 276, 217.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

15 Example 11-0301

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-phenylethyl)-1,4'-bipiperidin-3-amine

20 [1109] MS (ESI, Pos.20V) : 463 (M + H)⁺, 276, 232 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0302

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-ethyl-1,4'-bipiperidin-3-amine

25 [1110] MS (ESI, Pos.20V) : 387 (M + H)⁺, 276, 194 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.83.

Example 11-0303

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-benzyl-3'-methyl-1,4'-bipiperidin-3-amine

[1111] MS (ESI, Pos.20V) : 463 (M + H)⁺, 232 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.94.

35 Example 11-0304

4-azepan-1-yl-N-(1-cyclopent-3-en-1-ylpiperidin-3-yl)pyrimidin-2-amine

40 [1112] MS (ESI, Pos.20V) : 342 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0305

45 4-azepan-1-yl-N-[1-(1-propylheptyl)piperidin-3-yl]pyrimidin-2-amine

[1113] MS (ESI, Pos.20V) : 416 (M + H)⁺, 276, 208.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

50 Example 11-0306

4-azepan-1-yl-N-1-[2-(benzyloxy)-1-methylethyl]piperidin-3-ylpyrimidin-2-amine

55 [1114] MS (ESI, Pos.20V) : 424 (M + H)⁺, 334;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0307

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-isobutyl-1,4'-bipiperidin-3-amine

5 [1115] MS (ESI, Pos.20V): 415 (M + H)⁺, 276, 208 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min): 2.89.

Example 11-0308

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-tetrahydrothien-3-ylazepan-3-amine

[1116] MS (ESI, Pos.20V) : 376 (M + H)⁺, 290, 193;
HPLC condition : A; HPLC retention time (min) : 3.01.

15 Example 11-0309

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(3,3-dimethylcyclohexyl)azepan-3-amine

20 [1117] MS (ESI, Pos.20V) : 400 (M + H)⁺, 332, 200.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0310

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(2-methoxy-1-methylethyl)azepan-3-amine

25 [1118] MS (ESI, Pos.20V) : 362 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0311

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-cyclobutylazepan-3-amine

[1119] MS (ESI, Pos.20V) : 344 (M + H)⁺, 290, 172.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

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Example 11-0312

N-(4-azepan-1-ylpyrimidin-2-yl)-1-tetrahydro-2H-thiopyran-4-ylazepan-3-amine

40 [1120] MS (ESI, Pos.20V): 390 (M + H)⁺, 290, 195.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0313

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-cyclopentylazepan-3-amine

[1121] MS (ESI, Pos.20V) : 358 (M + H)⁺, 290, 179.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

50 Example 11-0314

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-methylbutyl)azepan-3-amine

55 [1122] MS (ESI, Pos.20V) : 360 (M + H)⁺, 290, 180.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0315

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(2,2-dimethoxy-1-methylethyl)azepan-3-amine

5 [1123] MS (ESI, Pos.20V) : 392 (M + H)⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0316

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1,3-dimethylbutyl)azepan-3-amine

[1124] MS (ESI, Pos.20V) : 374 (M + H)⁺, 187.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

15 Example 11-0317

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-methylpentyl)azepan-3-amine

20 [1125] MS (ESI, Pos.20V) : 374 (M + H)⁺, 187.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0318

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(3,3-dimethoxy-1-methylpropyl)azepan-3-amine

25 [1126] MS (ESI, Pos.20V) : 406 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0319

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-methylpent-4-enyl)azepan-3-amine

[1127] MS (ESI, Pos.20V) : 372 (M + H)⁺, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

35 Example 11-0320

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(2-methylcyclopentyl)azepan-3-amine

40 [1128] MS (ESI, Pos.20V) : 372 (M + H)⁺, 290, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0321

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(3-methylcyclopentyl)azepan-3-amine

[1129] MS (ESI, Pos.20V) : 372 (M + H)⁺, 290, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

50 Example 11-0322

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-methylpiperidin-4-yl)azepan-3-amine

55 [1130] MS (ESI, Pos.20V) : 387 (M + H)⁺, 290, 194 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.87.

Example 11-0323

N-(4-azepan-1-ylpyrimidin-2-yl)-1-cyclohept-2-en-1-ylazepan-3-amine

5 [1131] MS (ESI, Pos.20V) : 384 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0324

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-methylhexyl)azepan-3-amine

[1132] MS (ESI, Pos.20V) : 388 (M + H)⁺, 290, 194.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

15 Example 11-0325

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-ethylpentyl)azepan-3-amine

20 [1133] MS (ESI, Pos.20V) : 388 (M+H)⁺, 290, 194.5 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.20.

Example 11-0326

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(2-methylcyclohexyl)azepan-3-amine

25 [1134] MS (ESI, Pos.20V) : 386 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0327

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(3-methylcyclohexyl)azepan-3-amine

[1135] MS (ESI, Pos.20V) : 386 (M + H)⁺, 290, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) ; 3.14.

35 Example 11-0328

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(4-methylcyclohexyl)azepan-3-amine

40 [1136] MS (ESI, Pos.20V) : 386 (M + H)⁺, 290, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0329

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(3,4-dimethylcyclopentyl)azepan-3-amine

[1137] MS (ESI, Pos.20V) : 386 (M + H)⁺, 290, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 11-0330

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(2-methoxycyclohexyl)azepan-3-amine

55 [1138] MS (ESI, Pos.20V) : 402 (M + H)⁺, 290, 201.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0331

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-propylbutyl)azepan-3-amine

5 **[1139]** MS (ESI, Pos.20V): 388 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0332

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-cycloheptylazepan-3-amine

[1140] MS (ESI, Pos.20V) : 386 (M + H)⁺, 290, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

15 Example 11-0333

N-(4-azepan-1-ylpyrimidin-2-yl)-1-tricyclo[2.2.1.0^{2,6}]hept-3-ylazepan-3-amine

20 **[1141]** MS (ESI, Pos.20V) : 382 (M + H)⁺, 290, 191.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min); 3.05.

Example 11-0334

25 **[1142]** N-(4-azepan-1-ylpyrimidin-2-yl)-1-[(1R,5S)-8-methyl-8-azabicyclo[3.2.1]oct-3-yl]azepan-3-amine

Example 11-0335

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-isopropylpiperidin-4-yl)azepan-3-amine

30 **[1143]** MS (ESI, Pos.20V) : 415 (M + H)⁺, 290, 208 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.89.

Example 11-0336

35 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-methylheptyl)azepan-3-amine

[1144] MS (ESI, Pos.20V): 402 (M + H)⁺, 290, 201.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.33.

40 Example 11-0337

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-cyclohexylethyl)azepan-3-amine

45 **[1145]** MS (ESI, Pos.20V); 400 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0338

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-propylpiperidin-4-yl)azepan-3-amine

50 **[1146]** MS (ESI, Pos.20V) : 415 (M + H)⁺, 290, 208 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.90.

Example 11-0339

55 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1,4-dioxaspiro[4.5]dec-8-yl)azepan-3-amine

[1147] MS (ESI, Pos.20V) : 430 (M + H)⁺, 215.5 (M + 2H)²⁺;

HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0340

5 N-(4-azepan-1-ylpyrimidin-2-yl)-1-cyclooctylazepan-3-amine

[1148] MS (ESI, Pos.20V) : 400 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 3.20.

10 Example 11-0341

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[3-(diethylamino)-1-methylpropyl]azepan-3-amine

[1149] MS (ESI, Pos.20V) : 417 (M + H)⁺, 193;
15 HPLC condition : A; HPLC retention time (min) : 2.90.

Example 11-0342

20 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-ethylhexyl)azepan-3-amine

[1150] MS (ESI, Pos.20V) : 402 (M + H)⁺, 290, 201.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-0343

25

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(2,3-dihydro-1H-inden-2-yl)azepan-3-amine

[1151] MS (ESI, Pos.20V) : 406 (M + H)⁺, 203.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

30

Example 11-0344

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[4-(trifluoromethyl)cyclohexyl]azepan-3-amine

[1152] MS (ESI, Pos.20V) : 440 (M + H)⁺, 220.5 (M + 2H)²⁺;
35 HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0345

40 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(2-propylcyclohexyl)azepan-3-amine

[1153] MS (ESI, Pos.20V) : 414 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

45 Example 11-0346

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-methyl-3-phenylpropyl)azepan-3-amine

[1154] MS (ESI, Pos.20V) : 422 (M + H)⁺, 290, 211.5 (M + 2H)²⁺;
50 HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0347

55 N-(4-azepan-1-ylpyrimidin-2-yl)-1-decahydronaphthalen-2-ylazepan-3-amine

[1155] MS (ESI, Pos.20V) : 426 (M + H)⁺, 213.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0348

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1,2,3,4-tetrahydronaphthalen-2-yl)azepan-3-amine

5 **[1156]** MS (ESI, Pos.20V) : 420 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0349

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(6-methoxy-1,2,3,4-tetrahydronaphthalen-2-yl)azepan-3-amine

[1157] MS (ESI, Pos.20V) : 450 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 3.18.

15 Example 11-0350

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(7-methoxy-1,2,3,4-tetrahydronaphthalen-2-yl)azepan-3-amine

20 **[1158]** MS (ESI, Pos.20V) : 450 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0351

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-benzylpiperidin-4-yl)azepan-3-amine

25 **[1159]** MS (ESI, Pos.20V) : 463 (M + H)⁺, 290, 232 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0352

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-cyclododecylazepan-3-amine

[1160] MS (ESI, Pos.20V) : 456 (M + H)⁺, 290, 228.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.47.

35 Example 11-0353

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(4-phenylcyclohexyl)azepan-3-amine

40 **[1161]** MS (ESI, Pos.20V) : 448 (M + H)⁺, 224.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0354

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-phenylethyl)piperidin-4-yl]azepan-3-amine

[1162] MS (ESI, Pos.20V) : 477 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 3.05.

50 Example 11-0355

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-ethylpiperidin-4-yl)azepan-3-amine

55 **[1163]** MS (ESI, Pos.20V) : 401 (M + H)⁺, 290, 201 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.89.

Example 11-0356

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-benzyl-3-methylpiperidin-4-yl)azepan-3-amine

5 [1164] MS (ESI, Pos.20V) : 477 (M + H)⁺, 239 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0357

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[2-(benzyloxy)-1-methylethyl]azepan-3-amine

[1165] MS (ESI, Pos.20V) : 438 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

15 Example 11-0358

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-isobutylpiperidin-4-yl)azepan-3-amine

20 [1166] MS (ESI, Pos.20V) : 429 (M + H)⁺, 290, 215 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.92.

Example 11-0359

25 1-(2-adamantyl)-N-(4-azepan-1-ylpyrimidin-2-yl)azepan-3-amine

[1167] MS (ESI, Pos.20V) : 424 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0360

30 4-azepan-1-yl-N-[1-(1-isobutylpiperidin-3-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1168] MS (ESI, Pos.20V) : 415 (M + H)⁺, 345, 208 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

35 Example 11-0361

4-azepan-1-yl-N-[1-(1-butylpiperidin-3-yl)pyrrolidin-3-yl]pyrimidin-2-amine

40 [1169] MS (ESI, Pos.20V) : 415 (M + H)⁺, 345, 262, 208 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0362

45 4-azepan-1-yl-N-1-[1-(3-methylbenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1170] MS (ESI, Pos.20V) : 463 (M + H)⁺, 345, 232 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

50 Example 11-0363

N-[1-(1-acetyl)piperidin-3-yl]pyrrolidin-3-yl-4-azepan-1-ylpyrimidin-2-amine

55 [1171] MS (ESI, Pos.20V); 387 (M + H)⁺, 345, 194 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.90.

Example 11-0364

4-azepan-1-yl-N-1-[1-(4-fluorobenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 [1172] MS (ESI, Pos.20V): 467 (M + H)⁺, 345, 234 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0365

10 4-azepan-1-yl-N-1-[1-(4-methylbenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1173] MS (ESI, Pos.20V) : 463 (M + H)⁺, 345, 232 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

15 Example 11-0366

4-azepan-1-yl-N-[1-(1-heptanoylpiperidin-3-yl)pyrrolidin-3-yl]pyrimidin-2-amine

20 [1174] MS (ESI, Pos.20V) : 457 (M + H)⁺, 345, 229 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0367

25 4-azepan-1-yl-N-1-[1-(2-methoxybenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1175] MS (ESI, Pos.20V) : 479 (M + H)⁺, 345, 240 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0368

30 4-azepan-1-yl-N-1-[1-(2-methylbenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1176] MS (ESI, Pos.24V) : 463 (M + H)⁺, 345;
HPLC condition : A; HPLC retention time (min) : 3.09.

35 Example 11-0369

4-azepan-1-yl-N-[1-(1-hexanoylpiperidin-3-yl)pyrrolidin-3-yl]pyrimidin-2-amine

40 [1177] MS (ESI, Pos.20V) : 443 (M + H)⁺, 345, 222 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0370

45 4-azepan-1-yl-N-1-[1-(phenylacetyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1178] MS (ESI, Pos.20V) : 463 (M + H)⁺, 232 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

50 Example 11-0371

4-azepan-1-yl-N-1-[1-(4-methoxybenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 [1179] MS (ESI, Pos.20V) : 479 (M + H)⁺, 345, 135;
HPLC condition : A; HPLC retention time (min) : 3.06.

Example 11-0372

4-azepan-1-yl-N-(1-1-[(2E)-3-phenylprop-2-enoyl]piperidin-3-yl)pyrrolidin-3-ylpyrimidin-2-amine

5 **[1180]** MS (ESI, Pos.20V) : 949 (2M + H)⁺, 475 (M + H)⁺, 131;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0373

10 4-azepan-1-yl-N-[1-(1-propionylpiperidin-3-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1181] MS (ESI, Pos.20V) : 401 (M + H)⁺, 262, 201 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2, 94.

15 Example 11-0374

4-azepan-1-yl-N-1-[1-(cyclopropylcarbonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 **[1182]** MS (ESI, Pos.20V): 413 (M + H)⁺, 345, 207 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0375

25 4-azepan-1-yl-N-1-[1-(2-chlorobenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1183] MS (ESI, Pos.20V) : 483 (M + H)⁺, 345, 242 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0376

30

4-azepan-1-yl-N-1-[1-(cyclohexylcarbonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1184] MS (ESI, Pos.20V) : 455 (M + H)⁺, 345, 228 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.16.

35

Example 11-0377

4-azepan-1-yl-N-1-[1-(2-furoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1185]** MS (EST, Pos.20V): 439 (M + H)⁺, 262, 220 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0378

45 4-azepan-1-yl-N-[1-(1-pentanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1186] MS (ESI, Pos.20V) : 429 (M + H)⁺, 345, 215 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

50 Example 11-0379

4-azepan-1-yl-N-1-[1-(phenoxyacetyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 **[1187]** MS (ESI, Pos.20V) : 479 (M + H)⁺, 240 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0380

4-azepan-1-yl-N-[1-(1-octanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 [1188] MS (ESI, Pos.20V) : 471 (M + H)⁺, 345, 236 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.34.

Example 11-0381

10 4-azepan-1-yl-N-1-[1-(3-phenylpropanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1189] MS (ESI, Pos.20V) : 477 (M + H)⁺, 345, 239 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

15 Example 11-0382

4-azepan-1-yl-N-(1-[2-(trifluoromethyl)benzoyl]piperidin-3-yl)pyrrolidin-3-ylpyrimidin-2-amine

20 [1190] MS (ESI, Pos.20V) : 517 (M + H)⁺, 259 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0383

25 4-azepan-1-yl-N-1-[1-(2-naphthoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1191] MS (ESI, Pos.20V) : 997 (2M + H)⁺, 499 (M + H)⁺, 155;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0384

30 4-azepan-1-yl-N-1-[1-(thien-2-ylacetyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1192] MS (ESI, Pos.20V) : 469 (M + H)⁺, 235 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

35 Example 11-0385

4-azepan-1-yl-N-1-[1-(3,3-dimethylbutanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 [1193] MS (ESI, Pos.20V) : 443 (M + H)⁺, 345, 222 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0386

45 4-azepan-1-yl-N-1-[1-(3-methoxybenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1194] MS (ESI, Pos.20V) : 479 (M + H)⁺, 345, 240 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.07.

50 Example 11-0387

4-azepan-1-yl-N-1-[1-(2-ethylhexanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 [1195] MS (ESI, Pos.20V) : 471 (M + H)⁺, 345, 236 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0388

4-azepan-1-yl-N-1-[1-(3-fluorobenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 **[1196]** MS (ESI, Pos.20V) : 467 (M + H)⁺, 345, 234 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0389

10 4-azepan-1-yl-N-1-[1-(3-chlorobenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1197] MS (ESI, Pos.20V) : 483 (M + H)⁺, 345, 242 (M + 2H)²⁺, 139;
HPLC condition : A; HPLC retention time (min) : 3.14.

15 Example 11-0390

4-azepan-1-yl-N-1-[1-(4-tert-butylbenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 **[1198]** MS (ESI, Pos.20V) : 505 (M + H)⁺, 345, 161;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-0391

25 4-azepan-1-yl-N-1-[1-(thien-2-ylcarbonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1199] MS (ESI, Pos.20V) : 455 (M + H)⁺, 345, 228 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0392

30

4-azepan-1-yl-N-(1-1-[(4-chlorophenyl)acetyl]piperidin-3-yl)pyrrolidin-3-ylpyrimidin-2-amine

[1200] MS (ESI, Pos.20V) : 499, 497 (M + H)⁺, 249 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

35

Example 11-0393

4-azepan-1-yl-N-1-[1-(3-methylbutanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1201]** MS (ESI, Pos.20V) : 429 (M + H)⁺, 345, 215 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0394

45 4-azepan-1-yl-N-(1-1-[4-(trifluoromethyl)benzoyl]piperidin-3-yl)pyrrolidin-3-ylpyrimidin-2-amine

[1202] MS (ESI, Pos.20V) : 517 (M + H)⁺, 259 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

50 Example 11-0395

4-azepan-1-yl-N-[1-(1-benzoylpiperidin-3-yl)pyrrolidin-3-yl]pyrimidin-2-amine

55 **[1203]** MS (ESI, Pos.20V) : 449 (M + H)⁺, 345, 225 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0396

4-azepan-1-yl-N-1-[1-(2-fluorobenzoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 [1204] MS (ESI, Pos.20V) : 467 (M + H)⁺, 345, 234 (M + 2H)²⁺, 123;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0397

10 4-azepan-1-yl-N-1-[1-(diphenylacetyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1205] MS (ESI, Pos.20V) : 539 (M + H)⁺, 345, 270 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

15 Example 11-0398

4-azepan-1-yl-N-1-[1-(2-phenoxypropanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 [1206] MS (ESI, Pos.20V) : 493 (M + H)⁺, 247 (M + 2H)²⁺, 121;
HPLC condition: A; HPLC retention time (min) : 3.16.

Example 11-0399

25 4-azepan-1-yl-N-1-[1-(2-methylpentanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1207] MS (ESI, Pos.20V) : 443 (M + H)⁺, 345, 222 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0400

30 4-azepan-1-yl-N-1-[1-(methoxyacetyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1208] MS (ESI, Pos.20V) : 417 (M + H)⁺, 345, 262, 209 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.89.

35 Example 11-0401

ethyl 4-(3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl)piperidin-1-yl)-4-oxobutanoate

40 [1209] MS (ESI, Pos.20V) : 473 (M + H)⁺, 237 (M + 2H)²⁺, 214;
HPLC condition : A;
HPLC retention time (min) : 3.01.

Example 11-0402

45 4-azepan-1-yl-N-1-[1-(3-cyclopentylpropanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1210] MS (ESI, Pos.20V) : 469 (M + H)⁺, 345, 235 (M + 2H)²⁺;
HPLC condition: A;
50 HPLC retention time (min) : 3.25.

Example 11-0403

55 4-azepan-1-yl-N-1-[1-(2-propylpentanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1211] MS (ESI, Pos.20V) : 471 (M + H)⁺, 345, 236 (M + 2H)²⁺;
HPLC condition : A;
HPLC retention time (min) : 3.27.

Example 11-0404

Methyl 5-(3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl)piperidin-1-yl)-5-oxopentanoate

5 [1212] MS (ESI, Pos.20V) : 473 (M + H)⁺, 237 (M + 2H)²⁺, 221, 193;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0405

10 4-azepan-1-yl-N-(1-1-[(4-chlorophenoxy)acetyl]piperidin-3-yl)pyrrolidin-3-yl)pyrimidin-2-amine

[1213] MS (ESI, Pos.20V) : 515, 513 (M + H)⁺, 257 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

15 Example 11-0407

4-azepan-1-yl-N-1-[1-(cyclopentylacetyl)piperidin-3-yl]pyrrolidin-3-yl)pyrimidin-2-amine

20 [1214] MS (ESI, Pos.20V) : 455 (M + H)⁺, 345, 228 (M + 2H)²⁺, 173;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0408

25 4-azepan-1-yl-N-1-[1-(cyclopentylcarbonyl)piperidin-3-yl]pyrrolidin-3-yl)pyrimidin-2-amine

[1215] MS (ESI, Pos.20V) : 441 (M + H)⁺, 345, 221 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0409

30 4-azepan-1-yl-N-1-[1-(mesitylcarbonyl)piperidin-3-yl]pyrrolidin-3-yl)pyrimidin-2-amine

[1216] MS (ESI, Pos.20V) : 491 (M + H)⁺, 345, 147;
HPLC condition : A; HPLC retention time (min) : 3.23.

35 Example 11-0410

4-azepan-1-yl-N-(1-1-[(3-methoxyphenyl)acetyl]piperidin-3-yl)pyrrolidin-3-yl)pyrimidin-2-amine

40 [1217] MS (ESI, Pos.20V) : 493 (M + H)⁺, 247 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0411

45 ethyl 3-(3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl)piperidin-1-yl)-3-oxopropanoate

[1218] MS (ESI, Pos.20V) : 459 (M + H)⁺, 262, 230 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

50 Example 11-0412

4-azepan-1-yl-N-1-[1-(4-butoxybenzoyl)piperidin-3-yl]pyrrolidin-3-yl)pyrimidin-2-amine

55 [1219] MS (ESI, Pos.20V) : 521 (M + H)⁺, 345, 177;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-0413

4-azepan-1-yl-N-(1-1-[(benzyloxy)acetyl]piperidin-3-yl)pyrrolidin-3-ylpyrimidin-2-amine

5 **[1220]** MS (ESI, Pos.20V) : 493 (M + H)⁺, 403;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0414

10 4-azepan-1-yl-N-1-[1-(2-methylbutanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1221] MS (ESI, Pos.20V) : 429 (M + H)⁺, 345, 215 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

15 Example 11-0415

4-azepan-1-yl-N-(1-1-[(4-methoxyphenyl)acetyl]piperidin-3-yl)pyrrolidin-3-ylpyrimidin-2-amine

20 **[1222]** MS (ESI, Pos.20V) : 493 (M + H)⁺, 345, 247 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0416

ethyl 5-(3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl)piperidin-1-yl)-5-oxopentanoate

25 **[1223]** MS (ESI, Pos.20V) : 487 (M+H)⁺, 393, 244 (M + 2H)²⁺, 221;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0417

30 4-azepan-1-yl-N-1-[1-(cyclobutylcarbonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1224] MS (ESI, Pos.20V) : 427 (M + H)⁺, 345, 193;
HPLC condition : A; HPLC retention time (min): 3.03.

35 Example 11-0418

4-azepan-1-yl-N-1-[1-(2-ethylbutanoyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1225]** MS (ESI, Pos.20V) : 443 (M + H)⁺, 345, 222 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0419

45 4-azepan-1-yl-N-(1-1-[4-(trifluoromethoxy)benzoyl]piperidin-3-yl)pyrrolidin-3-ylpyrimidin-2-amine

[1226] MS (ESI, Pos.20V) : 533 (M + H)⁺, 345, 267 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

50 Example 11-4420

4-azepan-1-yl-N-1-[1-(methylsulfonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 **[1227]** MS (ESI, Pos.20V) : 423 (M + H)⁺, 345, 262 (M + 2H)²⁺, 212;
HPLC condition : A; HPLC retention time (min) : 2.94.

Example 11-0421

4-azepan-1-yl-N-1-[1-(pentylsulfonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 **[1228]** MS (ESI, Pos.20V) : 479 (M + H)⁺, 262, 240 (M + 2H)²⁺, 212;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0422

10 4-azepan-1-yl-N-1-[1-(propylsulfonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1229] MS (ESI, Pos.20V) : 451 (M + H)⁺, 262, 226 (M + 2H)²⁺, 190;
HPLC condition : A; HPLC retention time (min) : 3.05.

15 Example 11-0423

4-azepan-1-yl-N-1-[1-(isopropylsulfonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 **[1230]** MS (ESI, Pos.20V) : 451 (M + H)⁺, 345, 262, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0424

25 4-azepan-1-yl-N-(1-piperidin-3-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1231] MS (ESI, Pos.20V) : 345 (M + H)⁺, 262;
HPLC condition : A; HPLC retention time (min) : 2.80.

Example 11-0425

30 4-azepan-1-yl-N-1-[1-(butylsulfonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1232] MS (ESI, Pos.20V) : 465 (M + H)⁺, 262, 233(M + 2H)²⁺, 204;
HPLC condition : A; HPLC retention time (min) : 3.12.

35 Example 11-0426

4-azepan-1-yl-N-1-[1-(phenylsulfonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1233]** MS (ESI, Pos.20V) : 485 (M + H)⁺, 262, 243 (M + 2H)²⁺, 224;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0427

45 4-azepan-1-yl-N-[1-(1-[4-(trifluoromethyl)phenyl]sulfonylpiperidin-3-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1234] MS (ESI, Pos.20V) : 553 (M + H)⁺, 277(M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

50 Example 11-0428

4-azepan-1-yl-N-(1-1-[(4-methoxyphenyl)sulfonyl]piperidin-3-ylpyrrolidin-3-yl)pyrimidin-2-amine

55 **[1235]** MS (ESI, Pos.20V) : 515 (M + H)⁺, 345, 258 (M + 2H)²⁺, 171;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0429

4-azepan-1-yl-N-1-[1-(benzylsulfonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 [1236] MS (ESI, Pos.20V) : 499 (M + H)⁺, 345, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0430

10 4-azepan-1-yl-N-(1-1-[(4-methylphenyl)sulfonyl]piperidin-3-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1237] MS (ESI, Pos.20V) : 499 (M + H)⁺, 262, 250 (M + 2H)²⁺, 238;
HPLC condition : A; HPLC retention time (min) : 3.20.

15 Example 11-0431

4-azepan-1-yl-N-(1-1-[(3-methylphenyl)sulfonyl]piperidin-3-ylpyrrolidin-3-yl)pyrimidin-2-amine

20 [1238] MS (ESI, Pos.20V) : 499 (M + H)⁺, 262, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0432

25 4-azepan-1-yl-N-(1-1-[(2-methylphenyl)sulfonyl]piperidin-3-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1239] MS (ESI, Pos.20V) : 499 (M + H)⁺, 262, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0433

30 4-azepan-1-yl-N-[1-(1-[4-(trifluoromethoxy)phenyl]sulfonyl)piperidin-3-yl]pyrrolidin-3-yl]pyrimidin-2-amine

[1240] MS (ESI, Pos.20V) : 569 (M + H)⁺, 308, 285 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.34.

35 Example 11-0434

4-azepan-1-yl-N-(1-1-[(4-butoxyphenyl)sulfonyl]piperidin-3-ylpyrrolidin-3-yl)pyrimidin-2-amine

40 [1241] MS (ESI, Pos.20V) : 557 (M + H)⁺, 345, 279 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.44.

Example 11-0435

45 4-azepan-1-yl-N-(1-1-[(4-tert-butylphenyl)sulfonyl]piperidin-3-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1242] MS (ESI, Pos.20V) : 541 (M + H)⁺, 271 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.40.

50 Example 11-0436

4-azepan-1-yl-N-(1-1-[(4-nitrophenyl)sulfonyl]piperidin-3-ylpyrrolidin-3-yl)pyrimidin-2-amine

55 [1243] MS (ESI, Pos.20V) : 530 (M + H)⁺, 265 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0437

4-[(3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl)piperidin-1-yl)sulfonyl]benzonitrile

5 [1244] MS (ESI, Pos.20V) : 510 (M + H)⁺, 255(M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0438

10 4-azepan-1-yl-N-1-[1-(2-naphthylsulfonyl)piperidin-3-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1245] MS (ESI, Pos.20V) : 535 (M + H)⁺, 268 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

15 Example 11-0439

4-azepan-1-yl-N-[1-(1-isobutyrylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

20 [1246] MS (ESI, Pos.20V) : 415 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0440

25 4-azepan-1-yl-N-[1-(1-butyrylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1247] MS (ESI, Pos.20V) : 415 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0441

30 4-azepan-1-yl-N-1-[1-(3-methylbenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1248] MS (ESI, Pos.20V) : 463 (M + H)⁺, 345, 119;
HPLC condition : A; HPLC retention time (min) : 3.09.

35

Example 11-0442

N-[1-(1-acetylpiperidin-4-yl)pyrrolidin-3-yl]-4-azepan-1-ylpyrimidin-2-amine

40 [1249] MS (ESI, Pos.20V) : 387 (M + H)⁺, 345, 193;
HPLC condition : A; HPLC retention time (min) : 2.90.

Example 11-0443

45 4-azepan-1-yl-N-1-[1-(4-fluorobenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1250] MS (ESI, Pos.20V) : 467 (M + H)⁺, 345, 193, 123;
HPLC condition : A; HPLC retention time (min) : 3.07.

50 Example 11-0444

4-azepan-1-yl-N-1-[1-(4-methylbenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 [1251] MS (ESI, Pos.20V) : 463 (M + H)⁺, 345, 119;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0445

4-azepan-1-yl-N-[1-(1-heptanoylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

5 **[1252]** MS (ESI, Pos.20V) : 457 (M + H)⁺, 345, 229 (M + 2H)²⁺, 173;
HPLC condition : A; HPLC retention time (min) : 3.2.

Example 11-0446

10 4-azepan-1-yl-N-[1-(2-methoxybenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1253] MS (ESI, Pos.20V) : 479 (M + H)⁺, 345, 193, 135;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-0447

4-azepan-1-yl-N-[1-(2-methylbenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 **[1254]** MS (ESI, Pos.20V) : 463 (M + H)⁺, 345, 119;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0448

25 4-azepan-1-yl-N-[1-(1-hexanoylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

[1255] MS (ESI, Pos.20V) : 443 (M + H)⁺, 345, 173;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0449

30 4-azepan-1-yl-N-[1-(phenylacetyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1256] MS (ESI, Pos.20V) : 463 (M + H)⁺, 232 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

35

Example 11-0450

4-azepan-1-yl-N-[1-(4-methoxybenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1257]** MS (ESI, Pos.20V) : 479 (M + H)⁺, 345, 193, 135;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0451

45 4-azepan-1-yl-N-(1-[1-[(2E)-3-phenylprop-2-enoyl]piperidin-4-yl]pyrrolidin-3-yl)pyrimidin-2-amine

[1258] MS (ESI, Pos.20V) : 949 (2M + H)⁺, 475 (M + H)⁺, 345;
HPLC condition : A; HPLC retention time (min) : 3.14.

50 Example 11-0452

4-azepan-1-yl-N-[1-(1-propionylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

55 **[1259]** MS (ESI, Pos.20V) : 401 (M + H)⁺, 345, 173;
HPLC condition : A; HPLC retention time (min) : 2.90.

Example 11-0453

4-azepan-1-yl-N-1-[1-(cyclopropylcarbonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 [1260] MS (ESI, Pos.20V) : 413 (M + H)⁺, 345;
HPLC condition : A; HPLC retention time (min) : 2.94.

Example 11-0454

10 4-azepan-1-yl-N-1-[1-(2-chlorobenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1261] MS (ESI, Pos.20V) : 485, 483 (M + H)⁺, 345, 139;
HPLC condition : A; HPLC retention time (min) : 3.47.

15 Example 11-0455

4-azepan-1-yl-N-1-[1-(cyclohexylcarbonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 [1262] MS (ESI, Pos.20V) : 455 (M + H)⁺, 345;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0456

25 4-azepan-1-yl-N-1-[1-(2-furoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1263] MS (ESI, Pos.20V) : 439 (M + H)⁺, 220 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0457

30 4-azepan-1-yl-N-1-[1-(1-pentanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1264] MS (ESI, Pos.20V) : 429 (M + H)⁺, 345, 193;
HPLC condition : A; HPLC retention time (min) : 3.05.

35 Example 11-0458

4-azepan-1-yl-N-1-[1-(phenoxyacetyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 [1265] MS (ESI, Pos.20V) : 479 (M + H)⁺, 429, 240 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0459

45 4-azepan-1-yl-N-1-[1-(1-octanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1266] MS (ESI, Pos.20V) : 471 (M + H)⁺, 345, 236 (M + 2H)²⁺, 173;
HPLC condition : A; HPLC retention time (min) : 3.28.

50 Example 11-0460

4-azepan-1-yl-N-1-[1-(3-phenylpropanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 [1267] MS (ESI, Pos.20V) : 477 (M + H)⁺, 345, 239 (M + 2H)²⁺, 173;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0461

4-azepan-1-yl-N-(1-[2-(trifluoromethyl)benzoyl]piperidin-4-yl)pyrrolidin-3-ylpyrimidin-2-amine

5 **[1268]** MS (ESI, Pos.20V) : 517 (M + H)⁺, 259 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0462

10 4-azepan-1-yl-N-1-[1-(2-naphthoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1269] MS (ESI, Pos.20V) : 997 (2M + H)⁺, 499 (M + H)⁺, 155;
HPLC condition : A; HPLC retention time (min) : 3.18.

15 Example 11-0463

4-azepan-1-yl-N-1-[1-(thien-2-ylacetyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 **[1270]** MS (ESI, Pos.20V) : 469 (M + H)⁺, 235 (M + 2H)²⁺, 193;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0464

25 4-azepan-1-yl-N-1-[1-(3,3-dimethylbutanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1271] MS (ESI, Pos.20V) : 443 (M + H)⁺, 345, 173;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0465

30 4-azepan-1-yl-N-1-[1-(3-methoxybenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1272] MS (ESI, Pos.20V) : 479 (M + H)⁺, 345, 135;
HPLC condition : A; HPLC retention time (min) : 3.07.

35 Example 11-0466

4-azepan-1-yl-N-1-[1-(2-ethylhexanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1273]** MS (ESI, Pos.20V) : 471 (M + H)⁺, 345;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0467

45 4-azepan-1-yl-N-1-[1-(3-fluorobenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1274] MS (ESI, Pos.20V) : 467 (M + H)⁺, 345, 234 (M + 2H)²⁺, 123;
HPLC condition : A; HPLC retention time (min) : 3.07.

50 Example 11-0468

4-azepan-1-yl-N-1-[1-(3-chlorobenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 **[1275]** MS (ESI, Pos.20V) : 483 (M + H)⁺, 345, 138;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0469

4-azepan-1-yl-N-1-[1-(4-tert-butylbenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 **[1276]** MS (ESI, Pos.20V) : 505 (M + H)⁺, 345, 161;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0470

10 4-azepan-1-yl-N-1-[1-(thien-2-ylcarbonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1277] MS (ESI, Pos.20V) : 455 (M + H)⁺, 345, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-0471

4-azepan-1-yl-N-(1-1-[(4-chlorophenyl)acetyl]piperidin-4-yl)pyrrolidin-3-yl)pyrimidin-2-amine

20 **[1278]** MS (ESI, Pos.20V) : 499, 497 (M + H)⁺, 249 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0472

25 4-azepan-1-yl-N-1-[1-(3-methylbutanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1279] MS (ESI, Pos.20V) : 429 (M + H)⁺, 345, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0473

30 4-azepan-1-yl-N-(1-1-[4-(trifluoromethyl)benzoyl]piperidin-4-yl)pyrrolidin-3-yl)pyrimidin-2-amine

[1280] MS (ESI, Pos.20V) : 517 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

35 Example 11-0474

4-azepan-1-yl-N-[1-(1-benzoylpiperidin-4-yl)pyrrolidin-3-yl]pyrimidin-2-amine

40 **[1281]** MS (ESI, Pos.20V) : 449 (M + H)⁺, 345, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0475

45 4-azepan-1-yl-N-1-[1-(2-fluorobenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1282] MS (ESI, Pos.20V) : 467 (M + H)⁺, 345, 234 (M + 2H)²⁺, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

50 Example 11-0476

4-azepan-1-yl-N-1-[1-(diphenylacetyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 **[1283]** MS (ESI, Pos.20V) : 539 (M + H)⁺, 345, 167;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0477

4-azepan-1-yl-N-1-[1-(2-phenoxypropanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 **[1284]** MS (ESI, Pos.20V) : 493 (M + H)⁺, 345, 247 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0478

10 4-azepan-1-yl-N-1-[1-(2-methylpentanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1285] MS (ESI, Pos.20V) : 443 (M + H)⁺, 345;
HPLC condition : A; HPLC retention time (min) : 3.09.

15 Example 11-0479

4-azepan-1-yl-N-1-[1-(methoxyacetyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 **[1286]** MS (ESI, Pos.20V) : 417 (M + H)⁺, 345, 262 (M + 2H)²⁺, 209;
HPLC condition : A; HPLC retention time (min) : 2.86.

Example 11-0480

25 ethyl 4-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl)piperidin-1-yl)-4-oxobutanoate

[1287] MS (ESI, Pos.20V) : 473 (M + H)⁺, 214;
HPLC condition: A; HPLC retention time (min) : 3.00.

Example 11-0481

30 4-azepan-1-yl-N-1-[1-(3-cyclopentylpropanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1288] MS (ESI, Pos.20V) : 469 (M + H)⁺, 345, 235 (M + 2H)²⁺, 173;
HPLC condition : A; HPLC retention time (min) : 3.22.

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Example 11-0482

4-azepan-1-yl-N-1-[1-(2-propylpentanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1289]** MS (ESI, Pos.20V) : 471 (M + H)⁺, 345;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0483

45 methyl 5-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl)piperidin-1-yl)-5-oxopentanoate

[1290] MS (ESI, Pos.20V) : 473 (M + H)⁺, 221;
HPLC condition : A; HPLC retention time (min) : 3.00.

50 Example 11-0484

4-azepan-1-yl-N-(1-1-[(4-chlorophenoxy)acetyl]piperidin-4-yl)pyrrolidin-3-ylpyrimidin-2-amine

55 **[1291]** MS (ESI, Pos.20V) : 513 (M + H)⁺, 257 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0486

4-azepan-1-yl-N-1-[1-(cyclopentylacetyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 [1292] MS (ESI, Pos.20V) : 455 (M+H)⁺, 345, 173;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0487

10 4-azepan-1-yl-N-1-[1-(cyclopentylcarbonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1293] MS (ESI, Pos.20V) : 441 (M + H)⁺, 345, 193;
HPLC condition : A; HPLC retention time (min) : 3.05.

15 Example 11-0488

4-azepan-1-yl-N-1-[1-(mesitylcarbonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 [1294] MS (ESI, Pos.20V) : 491 (M + H)⁺, 345, 147;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0489

25 4-azepan-1-yl-N-(1-1-[(3-methoxyphenyl)acetyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1295] MS (ESI, Pos.20V) : 493 (M + H)⁺, 247 (M + 2H)²⁺, 173;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0490

30 ethyl 3-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl)piperidin-1-yl)-3-oxopropanoate

[1296] MS (ESI, Pos.20V) : 459 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.96.

35 Example 11-0491

4-azepan-1-yl-N-1-[1-(4-butoxybenzoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 [1297] MS (ESI, Pos.20V) : 521 (M + H)⁺, 345, 177;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0492

45 4-azepan-1-yl-N-(1-1-[(benzyloxy)acetyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1298] MS (ESI, Pos.20V) : 493 (M + H)⁺, 403;
HPLC condition : A; HPLC retention time (min) : 3.11.

50 Example 11-0493

4-azepan-1-yl-N-1-[1-(2-methylbutanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 [1299] MS (ESI, Pos.20V) : 429 (M + H)⁺, 345, 193;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0494

4-azepan-1-yl-N-(1-1-[(4-methoxyphenyl)acetyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

5 **[1300]** MS (ESI, Pos.20V) : 493 (M + H)⁺, 247 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0495

10 ethyl 5-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-ylpiperidin-1-yl)-5-oxopentanoate

[1301] MS (ESI, Pos.24V) : 487 (M + H)⁺, 393, 221;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-0496

4-azepan-1-yl-N-1-[1-(cyclobutylcarbonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 **[1302]** MS (ESI, Pos.20V) : 427 (M + H)⁺, 345, 193;
HPLC condition : A; HPLC retention time (min) : 3.02.

Example 11-0497

25 4-azepan-1-yl-N-1-[1-(2-ethylbutanoyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1303] MS (ESI, Pos.20V) : 443 (M + H)⁺, 345;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0498

30 4-azepan-1-yl-N-(1-1-[4-(trifluoromethoxy)benzoyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1304] MS (ESI, Pos.20V) : 533 (M + H)⁺, 189;
HPLC condition : A; HPLC retention time (min) : 3.22.

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Example 11-0499

4-azepan-1-yl-N-1-[1-(methylsulfonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1305]** MS (ESI, Pos.20V) : 423 (M + H)⁺, 262 (M + 2H)²⁺, 212;
HPLC condition : A; HPLC retention time (min) : 2.94.

Example 11-0500

45 4-azepan-1-yl-N-1-[1-(pentylsulfonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1306] MS (ESI, Pos.20V) : 957 (2M + H)⁺, 479 (M + H)⁺, 240(M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

50 Example 11-0501

4-azepan-1-yl-N-1-[1-(propylsulfonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 **[1307]** MS (ESI, Pos.20V) : 901 (2M + H)⁺, 451 (M + H)⁺, 226 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0502

4-azepan-1-yl-N-1-[1-(isopropylsulfonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

5 **[1308]** MS (ESI, Pos.20V) : 901 (2M + H)⁺, 451 (M + H)⁺, 226 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0503

10 4-azepan-1-yl-N-(1-piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1309] MS (ESI, Pos.20V) : 345 (M + H)⁺, 262, 173 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.79.

15 Example 11-0504

4-azepan-1-yl-N-1-[1-(butylsulfonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

20 **[1310]** MS (ESI, Pos.20V) : 929 (2M + H)⁺, 465 (M + H)⁺, 233 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0505

25 4-azepan-1-yl-N-1-[1-(phenylsulfonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

[1311] MS (ESI, Pos.20V) : 969 (2M + H)⁺, 485 (M + H)⁺, 243 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.13.

Example 11-0506

30 4-azepan-1-yl-N-(1-1-[4-(4-chlorophenyl)sulfonyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1312] MS (ESI, Pos.20V) : 521, 519 (M + H)⁺, 260 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

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Example 11-0507

4-azepan-1-yl-N-[1-(1-[4-(trifluoromethyl)phenyl]sulfonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

40 **[1313]** MS (ESI, Pos.20V) : 553 (M + H)⁺, 277 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.33.

Example 11-0508

45 4-azepan-1-yl-N-(1-1-[4-(4-methoxyphenyl)sulfonyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1314] MS (ESI, Pos.20V) : 515 (M + H)⁺, 345, 258 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 11-0509

4-azepan-1-yl-N-1-[1-(benzylsulfonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

55 **[1315]** MS (ESI, Pos.20V) : 997 (2M + H)⁺, 499 (M + H)⁺, 345;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0510

4-azepan-1-yl-N-(1-1-[(4-methylphenyl)sulfonyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

5 **[1316]** MS (ESI, Pos.20V) : 997 (2M + H)⁺, 499 (M + H)⁺, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0511

10 4-azepan-1-yl-N-(1-1-[(3-methylphenyl)sulfonyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1317] MS (ESI, Pos.20V) : 997 (2M + H)⁺, 499 (M + H)⁺, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

15 Example 11-0512

4-azepan-1-yl-N-(1-1-[(2-methylphenyl)sulfonyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

20 **[1318]** MS (ESI, Pos.20V) : 997 (2M + H)⁺, 499 (M + H)⁺, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0513

25 4-azepan-1-yl-N-[1-(1-[4-(trifluoromethoxy)phenyl]sulfonyl]piperidin-4-ylpyrrolidin-3-yl]pyrimidin-2-amine

[1319] MS (ESI, Pos.20V) : 569 (M + H)⁺, 285 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.34.

Example 11-0514

30 4-azepan-1-yl-N-(1-1-[(4-butoxyphenyl)sulfonyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1320] MS (ESI, Pos.20V) : 557 (M + H)⁺, 345, 279 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

35 Example 11-0515

4-azepan-1-yl-N-(1-1-[(4-tert-butylphenyl)sulfonyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

40 **[1321]** MS (ESI, Pos.20V) : 541 (M + H)⁺, 271 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

Example 11-0516

45 4-azepan-1-yl-N-(1-1-[(4-nitrophenyl)sulfonyl]piperidin-4-ylpyrrolidin-3-yl)pyrimidin-2-amine

[1322] MS (ESI, Pos.20V) : 530 (M + H)⁺, 278;
HPLC condition : A; HPLC retention time (min) : 3.22.

50 Example 11-0517

4-[(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]pyrrolidin-1-yl)piperidin-1-yl)sulfonyl]benzonitrile

55 **[1323]** MS (ESI, Pos.20V) : 510 (M + H)⁺, 255.5 (M + 2H)²⁺, 186;
HPLC condition : A; HPLC retention time (min) : 3.18.

EP 1 571 146 A1

Example 11-0518

4-azepan-1-yl-N-1-[1-(2-naphthylsulfonyl)piperidin-4-yl]pyrrolidin-3-ylpyrimidin-2-amine

- 5 **[1324]** MS (ESI, Pos.20V) : 535 (M + H)⁺, 268(M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-0519

- 10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-isobutyryl-1,3'-bipiperidin-3-amine

[1325] MS (ESI, Pos.20V) : 429 (M + H)⁺, 359, 276, 215 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

- 15 Example 11-0520

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-butyryl-1,3'-bipiperidin-3-amine

- 20 **[1326]** MS (ESI, Pos.20V) : 429 (M + H)⁺, 359, 276, 215 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0521

- 25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-methylbenzoyl)-1,3'-bipiperidin-3-amine

[1327] MS (ESI, Pos.20V) : 477 (M + H)⁺, 359, 239 (M + 2H)²⁺, 119;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0522

- 30 1'-acetyl-N-(4-azepan-1-ylpyrimidin-2-yl)-1,3'-bipiperidin-3-amine

[1328] MS (ESI, Pos.20V) : 401 (M + H)⁺, 359, 276, 201 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.90.

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Example 11-0523

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-fluorobenzoyl)-1,3'-bipiperidin-3-amine

- 40 **[1329]** MS (ESI, Pos.20V) : 481 (M + H)⁺, 359, 241 (M + 2H)²⁺, 123;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0524

- 45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-methylbenzoyl)-1,3'-bipiperidin-3-amine

[1330] MS (ESI, Pos.20V) : 477 (M + H)⁺, 359, 239 (M + 2H)²⁺, 119;
HPLC condition : A; HPLC retention time (min) : 3.11.

- 50 Example 11-0525

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-heptanoyl-1,3'-bipiperidin-3-amine

- 55 **[1331]** MS (ESI, Pos.20V) : 471 (M + H)⁺, 359, 236 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 11-0526

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-methoxybenzoyl)-1,3'-bipiperidin-3-amine

5 [1332] MS (ESI, Pos.20V) : 493 (M + H)⁺, 359, 247 (M + 2H)²⁺, 135;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0527

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-methylbenzoyl)-1,3'-bipiperidin-3-amine

[1333] MS (ESI, Pos.20V) : 477 (M + H)⁺, 359, 239 (M + 2H)²⁺, 119;
HPLC condition : A; HPLC retention time (min) : 3.09.

15 Example 11-0528

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-hexanoyl-1,3'-bipiperidin-3-amine

20 [1334] MS (ESI, Pos.20V) : 457 (M + H)⁺, 359, 276, 229 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0529

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(phenylacetyl)-1,3'-bipiperidin-3-amine

[1335] MS (ESI, Pos.20V) : 477 (M + H)⁺, 239 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0530

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-methoxybenzoyl)-1,3'-bipiperidin-3-amine

[1336] MS (ESI, Pos.20V) : 493 (M + H)⁺, 359, 247 (M + 2H)²⁺, 135;
HPLC condition : A; HPLC retention time (min): 3.07.

35 Example 11-0531

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(2E)-3-phenylprop-2-enoyl]-1,3'-bipiperidin-3-amine

40 [1337] MS (ESI, Pos.20V) : 489 (M + H)⁺, 359, 245 (M + 2H)²⁺, 204;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0532

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-propionyl-1,3'-bipiperidin-3-amine

[1338] MS (ESI, Pos.20V) : 415 (M + H)⁺, 359, 276, 208 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.94.

50 Example 11-0533

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclopropylcarbonyl)-1,3'-bipiperidin-3-amine

55 [1339] MS (ESI, Pos.20V) : 427 (M + H)⁺, 359, 276, 214 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0534

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-chlorobenzoyl)-1,3'-bipiperidin-3-amine

5 [1340] MS (ESI, Pos.20V) : 499, 497 (M + H)⁺, 359, 249 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0535

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclohexylcarbonyl)-1,3'-bipiperidin-3-amine

[1341] MS (ESI, Pos.20V) : 469 (M + H)⁺, 359, 235 (M + 2H)²⁺, 111;
HPLC condition : A; HPLC retention time (min) : 3.16.

15 Example 11-0536

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-furoyl)-1,3'-bipiperidin-3-amine

20 [1342] MS (ESI, Pos.20V) : 453 (M + H)⁺, 276, 227 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0537

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-pentanoyl-1,3'-bipiperidin-3-amine

25 [1343] MS (ESI, Pos.20V) : 443 (M + H)⁺, 359, 222(M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0538

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(phenoxyacetyl)-1,3'-bipiperidin-3-amine

[1344] MS (ESI, Pos.20V) : 493 (M + H)⁺, 276, 247 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

35 Example 11-0539

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-octanoyl-1,3'-bipiperidin-3-amine

40 [1345] MS (ESI, Pos.20V) : 485 (M + H)⁺, 359, 243 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.33.

Example 11-0540

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-phenylpropanoyl)-1,3'-bipiperidin-3-amine

[1346] MS (ESI, Pos.20V) : 491 (M + H)⁺, 359, 246 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 11-0541

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[2-(trifluoromethyl)benzoyl]-1,3'-bipiperidin-3-amine

55 [1347] MS (ESI, Pos.20U) : 531 (M + H)⁺, 266 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0542

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-naphthoyl)-1,3'-bipiperidin-3-amine

5 **[1348]** MS (ESI, Pos.20V) : 513 (M + H)⁺, 3 59, 257 (M + 2H)²⁺, 155;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0543

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(thien-2-ylacetyl)-1,3'-bipiperidin-3-amine

[1349] MS (ESI, Pos.20V) : 483 (M + H)⁺, 276, 242 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.09.

15 Example 11-0544

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3,3-dimethylbutanoyl)-1,3'-bipiperidin-3-amine

20 **[1350]** MS (ESI, Pos.20V) : 457 (M + H)⁺, 359, 229 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0545

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-methoxybenzoyl)-1,3'-bipiperidin-3-amine

25 **[1351]** MS (ESI, Pos.20V) : 493 (M + H)⁺, 359, 247 (M + 2H)²⁺, 135;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0546

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N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-ethylhexanoyl)-1,3'-bipiperidin-3-amine

[1352] MS (ESI, Pos.20V) : 485 (M + H)⁺, 359, 243 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.25.

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Example 11-0547

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-fluorobenzoyl)-1,3'-bipiperidin-3-amine

40 **[1353]** MS (ESI, Pos.20V) : 481 (M + H)⁺, 359, 241 (M + 2H)²⁺, 123;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0548

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-chlorobenzoyl)-1,3'-bipiperidin-3-amine

[1354] MS (ESI, Pos.20V) : 499, 497 (M + H)⁺, 359, 249 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

50 Example 11-0549

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-tert-butylbenzoyl)-1,3'-bipiperidin-3-amine

55 **[1355]** MS (ESI, Pos.20V) : 519 (M + H)⁺, 359, 260 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-0550

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(thien-2-ylcarbonyl)-1,3'-bipiperidin-3-amine

5 **[1356]** MS (ESI, Pos.20V) : 469 (M + H)⁺, 359, 235 (M + 2H)²⁺, 111;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0551

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-chlorophenyl)acetyl]-1,3'-bipiperidin-3-amine

[1357] MS (ESI, Pos.24V) : 513, 511 (M + H)⁺, 256 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

15 Example 11-0552

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-methylbutanoyl)-1,3'-bipiperidin-3-amine

20 **[1358]** MS (ESI, Pos.20V) : 443 (M + H)⁺, 359, 222 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0553

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[4-(trifluoromethyl)benzoyl]-1,3'-bipiperidin-3-amine

[1359] MS (ESI, Pos.20V) : 531 (M + H)⁺, 266 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0554

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-benzoyl-1,3'-bipiperidin-3-amine

[1360] MS (ESI, Pos.20V) : 463 (M + H)⁺, 359, 232 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

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Example 11-0555

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-fluorobenzoyl)-1,3'-bipiperidin-3-amine

40 **[1361]** MS (ESI, Pos.20V) : 481 (M + H)⁺, 359, 241 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0556

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(diphenylacetyl)-1,3'-bipiperidin-3-amine

[1362] MS (ESI, Pos.20V) : 553 (M + H)⁺, 359, 277 (M + 2H)²⁺, 167;
HPLC condition : A; HPLC retention time (min) : 3.27.

50 Example 11-0557

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-phenoxypropanoyl)-1,3'-bipiperidin-3-amine

55 **[1363]** MS (ESI, Pos.20V) : 507 (M + H)⁺, 254 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0558

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-methylpentanoyl)-1,3'-bipiperidin-3-amine

5 **[1364]** MS (ESI, Pos.20V) : 457 (M + H)⁺, 359, 229 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0559

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(methoxyacetyl)-1,3'-bipiperidin-3-amine

[1365] MS (ESI, Pos. 20V) : 431 (M + H)⁺, 359, 216 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.90.

15 Example 11-0560

ethyl 4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,3'-bipiperidin-1'-yl-4-oxobutanoate

20 **[1366]** MS (ESI, Pos.20V) : 487 (M + H)⁺, 359, 244 (M + 2H)²⁺, 211;
HPLC condition : A; HPLC retention time (min) : 3.02.

Example 11-0561

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-cyclopentylpropanoyl)-1,3'-bipiperidin-3-amine

[1367] MS (ESI, Pos.20V) : 483 (M + H)⁺, 359, 242 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0562

30

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-propylpentanoyl)-1,3'-bipiperidin-3-amine

[1368] MS (ESI, Pos.20V) : 485 (M + H)⁺, 359, 243 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

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Example 11-0563

methyl 5-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,3'-bipiperidin-1'-yl-5-oxopentanoate

40 **[1369]** MS (ESI, Pos.20V) : 487 (M + H)⁺, 228;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0564

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-chlorophenoxy)acetyl]-1,3'-bipiperidin-3-amine

[1370] MS (ESI, Pos.20V) : 529, 527 (M + H)⁺, 264 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

50 Example 11-0566

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclopentylacetyl)-1,3'-bipiperidin-3-amine

55 **[1371]** MS (ESI, Pos.20V) : 469 (M + H)⁺, 359, 235 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0567

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclopentylcarbonyl)-1,3'-bipiperidin-3-amine

5 **[1372]** MS (ESI, Pos.20V) : 455 (M + H)⁺, 359, 228 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0568

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(mesitylcarbonyl)-1,3'-bipiperidin-3-amine

[1373] MS (ESI, Pos.20V) : 505 (M + H)⁺, 359, 147;
HPLC condition : A; HPLC retention time (min) : 3.23.

15 Example 11-0569

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(3-methoxyphenyl)acetyl]-1,3'-bipiperidin-3-amine

20 **[1374]** MS (ESI, Pos.20V) : 507 (M + H)⁺, 359, 254 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0570

ethyl 3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,3'-bipiperidin-1'-yl-3-oxopropanoate

25 **[1375]** MS (ESI, Pos.20V) : 473 (M + H)⁺, 276, 237 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0571

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-butoxybenzoyl)-1,3'-bipiperidin-3-amine

[1376] MS (ESI, Pos.20V) : 535 (M + H)⁺, 359, 177;
HPLC condition : A; HPLC retention time (min) : 3.33.

35 Example 11-0572

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(benzyloxy)acetyl]-1,3'-bipiperidin-3-amine

40 **[1377]** MS (ESI, Pos.20V) : 507 (M + H)⁺, 417;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0573

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-methylbutanoyl)-1,3'-bipiperidin-3-amine

[1378] MS (ESI, Pos.20V) : 465 (M + Na)⁺, 443 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

50 Example 11-0574

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-methoxyphenyl)acetyl]-1,3'-bipiperidin-3-amine

55 **[1379]** MS (ESI, Pos.20V) : 507 (M + H)⁺, 359, 254 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0575

ethyl 5-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,3'-bipiperidin-1'-yl-5-oxopentanoate

5 [1380] MS (ESI, Pos.20V) : 501 (M + H)⁺, 228;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0576

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclobutylcarbonyl)-1,3'-bipiperidin-3-amine

[1381] MS (ESI, Pos.20V) : 441 (M + H)⁺, 359, 221 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-0577

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-ethylbutanoyl)-1,3'-bipiperidin-3-amine

20 [1382] MS (ESI, Pos.20V) : 457 (M + H)⁺, 359, 229 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0578

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[4-(trifluoromethoxy)benzoyl]-1,3'-bipiperidin-3-amine

[1383] MS (ESI, Pos.20V) : 547 (M + H)⁺, 359, 274 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 11-0579

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(methylsulfonyl)-1,3'-bipiperidin-3-amine

[1384] MS (ESI, Pos.20V) : 437 (M + H)⁺, 359, 276;
HPLC condition : A; HPLC retention time (min) : 2.96.

35 Example 11-0580

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(pentylsulfonyl)-1,3'-bipiperidin-3-amine

40 [1385] MS (ESI, Pos.20V) : 493 (M + H)⁺, 276, 247 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0581

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(propylsulfonyl)-1,3'-bipiperidin-3-amine

[1386] MS (ESI, Pos.20V) : 465 (M + H)⁺, 276, 233 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

50 Example 11-0582

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(isopropylsulfonyl)-1,3'-bipiperidin-3-amine

55 [1387] MS (ESI, Pos.20V) : 465 (M + H)⁺, 359, 276, 233 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0583

N-(4-azepan-1-ylpyrimidin-2-yl)-1,3'-bipiperidin-3-amine

5 **[1388]** MS (ESI, Pos.20V) : 359 (M + H)⁺, 276;
HPLC condition : A; HPLC retention time (min) : 2.83.

Example 11-0584

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(butylsulfonyl)-1,3'-bipiperidin-3-amine

[1389] MS (ESI, Pos.20V) : 479 (M + H)⁺, 276, 240 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

15 Example 11-0585

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(phenylsulfonyl)-1,3'-bipiperidin-3-amine

20 **[1390]** MS (ESI, Pos.20V) : 499 (M + H)⁺, 276, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0586

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-chlorophenyl)sulfonyl]-1,3'-bipiperidin-3-amine

[1391] MS (ESI, Pos.20V) : 535, 533 (M + H)⁺, 267 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0587

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[4-(trifluoromethyl)phenyl]sulfonyl-1,3'-bipiperidin-3-amine

[1392] MS (ESI, Pos.20V) : 567 (M + H)⁺, 284 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

35 Example 11-0588

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-methoxyphenyl)sulfonyl]-1,3'-bipiperidin-3-amine

40 **[1393]** MS (ESI, Pos.20V) : 529 (M + H)⁺, 265 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0589

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(benzylsulfonyl)-1,3'-bipiperidin-3-amine

[1394] MS (ESI, Pos.20V) : 513 (M + H)⁺, 359, 257 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

50 Example 11-0590

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-methylphenyl)sulfonyl]-1,3'-bipiperidin-3-amine

55 **[1395]** MS (ESI, Pos.20V) : 513 (M + H)⁺, 276, 257 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0591

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(3-methylphenyl)sulfonyl]-1,3'-bipiperidin-3-amine

5 **[1396]** MS (ESI, Pos.20V) : 513 (M + H)⁺, 276, 257 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0592

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(2-methylphenyl)sulfonyl]-1,3'-bipiperidin-3-amine

[1397] MS (ESI, Pos.20V) : 513 (M + H)⁺, 276, 257 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

15 Example 11-0593

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[4-(trifluoromethoxy)phenyl]sulfonyl-1,3'-bipiperidin-3-amine

20 **[1398]** MS (ESI, Pos.20V) : 583 (M + H)⁺, 292 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.33.

Example 11-0594

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-butoxyphenyl)sulfonyl]-1,3'-bipiperidin-3-amine

[1399] MS (ESI, Pos.20V) : 571 (M + H)⁺, 286 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

Example 11-0595

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-tert-butylphenyl)sulfonyl]-1,3'-bipiperidin-3-amine

[1400] MS (ESI, Pos.20V) : 555 (M + H)⁺, 278 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.38.

35 Example 11-0596

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-nitrophenyl)sulfonyl]-1,3'-bipiperidin-3-amine

40 **[1401]** MS (ESI, Pos.20V) : 544 (M + H)⁺, 272.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0597

45 4-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,3'-bipiperidin-1'-ylsulfonyl)benzonitrile

[1402] MS (ESI, Pos.20V) : 524 (M + H)⁺, 262.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 11-0598

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-naphthylsulfonyl)-1,3'-bipiperidin-3-amine

55 **[1403]** MS (ESI, Pos.20V) : 549 (M + H)⁺, 275 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0599

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-isobutyryl-1,4'-bipiperidin-3-amine

5 [1404] MS (ESI, Pos.20V) : 429 (M + H)⁺, 359;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0600

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-butyryl-1,4'-bipiperidin-3-amine

[1405] MS (ESI, Pos.20V) : 429 (M + H)⁺, 359, 193;
HPLC condition : A; HPLC retention time (min) : 2.96.

15 Example 11-0601

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-methylbenzoyl)-1,4'-bipiperidin-3-amine

20 [1406] MS (ESI, Pos.20V) : 477 (M + H)⁺, 359, 119;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0602

25 1'-acetyl-N-(4-azepan-1-ylpyrimidin-2-yl)-1,4'-bipiperidin-3-amine

[1407] MS (ESI, Pos.20V) : 401 (M + H)⁺, 359, 276, 201 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.87.

Example 11-0603

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-fluorobenzoyl)-1,4'-bipiperidin-3-amine

[1408] MS (ESI, Pos.20V) : 481 (M + H)⁺, 359, 123;
HPLC condition : A; HPLC retention time (min) : 3.05.

35 Example 11-0604

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-methylbenzoyl)-1,4'-bipiperidin-3-amine

40 [1409] MS (ESI, Pos.20V) : 477 (M + H)⁺, 359, 119;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0605

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-heptanoyl-1,4'-bipiperidin-3-amine

[1410] MS (ESI, Pos.20V) : 471 (M + H)⁺, 236 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.20.

50 Example 11-0606

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-methoxybenzoyl)-1,4'-bipiperidin-3-amine

55 [1411] MS (ESI, Pos.20V) : 493 (M + H)⁺, 359, 193, 135;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0607

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-methylbenzoyl)-1,4'-bipiperidin-3-amine

5 [1412] MS (ESI, Pos.20V) : 477 (M + H)⁺, 359, 193;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0608

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-hexanoyl-1,4'-bipiperidin-3-amine

[1413] MS (ESI, Pos.20V) : 457 (M + H)⁺, 359, 229 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.11.

15 Example 11-0609

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(phenylacetyl)-1,4'-bipiperidin-3-amine

20 [1414] MS (ESI, Pos.20V): 477 (M + H)⁺, 359, 239 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0610

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-methoxybenzoyl)-1,4'-bipiperidin-3-amine

[1415] MS (ESI, Pos.20V) : 493 (M+H)⁺, 359, 193, 135;
HPLC condition: A; HPLC retention time (min) : 3.03.

Example 11-0611

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(2E)-3-phenylprop-2-enoyl]-1,4'-bipiperidin-3-amine

[1416] MS (ESI, Pos.20V): 977 (2M + H)⁺, 489 (M + H)⁺, 359;
HPLC condition : A; HPLC retention time (min) : 3.11.

35

Example 11-0612

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-propionyl-1,4'-bipiperidin-3-amine

40 [1417] MS (ESI, Pos.20V) : 415 (M + H)⁺, 359, 180;
HPLC condition : A; HPLC retention time (min) : 2.90.

Example 11-0613

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclopropylcarbonyl)-1,4'-bipiperidin-3-amine

[1418] MS (ESI, Pos.20V) : 427 (M + H)⁺, 359;
HPLC condition : A; HPLC retention time (min) : 2.94.

50 Example 11-0614

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-chlorobenzoyl)-1,4'-bipiperidin-3-amine

55 [1419] MS (ESI, Pos.20V) : 499, 497 (M + H)⁺, 359, 249 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

EP 1 571 146 A1

Example 11-0615

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclohexylcarbonyl)-1,4'-bipiperidin-3-amine

5 **[1420]** MS (ESI, Pos.20V) : 469 (M + H)⁺, 359;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0616

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-furoyl)-1,4'-bipiperidin-3-amine

[1421] MS (ESI, Pos.20V) : 453 (M + H)⁺, 359, 227 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.96.

15 Example 11-0617

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-pentanoyl-1,4'-bipiperidin-3-amine

20 **[1422]** MS (ESI, Pos.20V) : 443 (M + H)⁺, 359, 222 (M + 2H)²⁺, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0618

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(phenoxyacetyl)-1,4'-bipiperidin-3-amine

25 **[1423]** MS (ESI, Pos.20V) : 493 (M + H)⁺, 443, 247 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0619

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-octanoyl-1,4'-bipiperidin-3-amine

[1424] MS (ESI, Pos.20V) : 485 (M + H)⁺, 359, 243 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.25.

35 Example 11-0620

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-phenylpropanoyl)-1,4'-bipiperidin-3-amine

40 **[1425]** MS (ESI, Pos.20V) : 491 (M + H)⁺, 359, 246 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0621

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[2-(trifluoromethyl)benzoyl]-1,4'-bipiperidin-3-amine

[1426] MS (ESI, Pos.20V) : 531 (M + H)⁺, 359, 266 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

50 Example 11-0622

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-naphthoyl)-1,4'-bipiperidin-3-amine

55 **[1427]** MS (ESI, Pos.20V) : 513 (M + H)⁺, 359, 155;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0623

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(thien-2-ylacetyl)-1,4'-bipiperidin-3-amine

5 **[1428]** MS (ESI, Pos.20V) : 483 (M + H)⁺, 242 (M + 2H)²⁺, 193;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0624

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3,3-dimethylbutanoyl)-1,4'-bipiperidin-3-amine

[1429] MS (ESI, Pos.20V) : 457 (M + H)⁺, 359, 180;
HPLC condition : A; HPLC retention time (min) : 3.07.

15 Example 11-0625

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-methoxybenzoyl)-1,4'-bipiperidin-3-amine

20 **[1430]** MS (ESI, Pos.20V) : 493 (M + H)⁺, 359, 193, 135;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0626

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-ethylhexanoyl)-1,4'-bipiperidin-3-amine

[1431] MS (ESI, Pos.20V) : 485 (M + H)⁺, 359;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0627

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-fluorobenzoyl)-1,4'-bipiperidin-3-amine

[1432] MS (ESI, Pos.20V) : 481 (M + H)⁺, 359, 241 (M + 2H)²⁺, 123;
HPLC condition : A; HPLC retention time (min) : 3.05.

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Example 11-0628

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-chlorobenzoyl)-1,4'-bipiperidin-3-amine

40 **[1433]** MS (ESI, Pos.20V) : 499, 497 (M + H)⁺, 359, 249 (M + 2H)²⁺, 139
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0629

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-tert-butylbenzoyl)-1,4'-bipiperidin-3-amine

[1434] MS (ESI, Pos.20V) : 519 (M+H)⁺, 359, 161;
HPLC condition : A; HPLC retention time (min) : 3.25.

50 Example 11-0630

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(thien-2-ylcarbonyl)-1,4'-bipiperidin-3-amine

55 **[1435]** MS (ESI, Pos.20V) : 469 (M + H)⁺, 359, 193;
HPLC condition: A; HPLC retention time (min) : 3.01.

Example 11-0631

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-chlorophenyl)acetyl]-1,4'-bipiperidin-3-amine

5 **[1436]** MS (ESI, Pos.20V) : 513, 511 (M + H)⁺, 359, 256 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0632

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-methylbutanoyl)-1,4'-bipiperidin-3-amine

[1437] MS (ESI, Pos.20V) : 443 (M + H)⁺, 359, 193;
HPLC condition : A; HPLC retention time (min) : 3.01.

15 Example 11-0633

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[4-(trifluoromethyl)benzoyl]-1,4'-bipiperidin-3-amine

20 **[1438]** MS (ESI, Pos.20V) : 531 (M + H)⁺, 266 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0634

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-benzoyl-1,4'-bipiperidin-3-amine

25 **[1439]** MS (ESI, Pos.20V) : 463 (M + H)⁺, 359, 193
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0635

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-fluorobenzoyl)-1,4'-bipiperidin-3-amine

[1440] MS (ESI, Pos.20V) : 481 (M + H)⁺, 359, 241 (M + 2H)²⁺, 193;
HPLC condition : A; HPLC retention time (min) : 3.01.

35 Example 11-0636

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(diphenylacetyl)-1,4'-bipiperidin-3-amine

40 **[1441]** MS (ESI, Pos.20V) : 553 (M + H)⁺, 359, 277 (M + 2H)²⁺, 167;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 11-0637

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-phenoxypropanoyl)-1,4'-bipiperidin-3-amine

[1442] MS (ESI, Pos.20V) : 507 (M + H)⁺, 359, 254 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.11.

50 Example 11-0638

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-methylpentanoyl)-1,4'-bipiperidin-3-amine

55 **[1443]** MS (ESI, Pos.20V) : 457 (M + H)⁺, 359;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0639

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(methoxyacetyl)-1,4'-bipiperidin-3-amine

5 [1444] MS (ESI, Pos.20V) : 431 (M + H)⁺, 359, 276, 216 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.87.

Example 11-0640

10 ethyl 4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-yl-4-oxobutanoate

[1445] MS (ESI, Pos.20V) : 487 (M + H)⁺, 244 (M + 2H)²⁺, 221;
HPLC condition : A; HPLC retention time (min) : 3.00.

15 Example 11-0641

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(3-cyclopentylprapanoyl)-1,4'-bipiperidin-3-amine

20 [1446] MS (ESI, Pos.24V) : 483 (M + H)⁺, 359, 242 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0642

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-propylpentanoyl)-1,4'-bipiperidin-3-amine

[1447] MS (ESI, Pos.20V) : 485 (M + H)⁺, 359;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0643

30 methyl 5-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-yl-5-oxopentanoate

[1448] MS (ESI, Pos.20V) : 487 (M + H)⁺, 228;
HPLC condition : A; HPLC retention time (min) : 2.96.

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Example 11-0644

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-chlorophenoxy)acetyl]-1,4'-bipiperidin-3-amine

40 [1449] MS (ESI, Pos.20V) : 529, 527 (M + H)⁺, 264 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0646

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclopentylcarbonyl)-1,4'-bipiperidin-3-amine

[1450] MS (ESI, Pos.20V) : 455 (M + H)⁺, 359, 193;
HPLC condition : A; HPLC retention time (min) : 3.05.

50 Example 11-0647

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(mesitylcarbonyl)-1,4'-bipiperidin-3-amine

55 [1451] MS (ESI, Pos.20V) : 505 (M + H)⁺, 359, 267, 147;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0648

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(3-methoxyphenyl)acetyl]-1,4'-bipiperidin-3-amine

5 **[1452]** MS (ESI, Pos.20V) : 507 (M + H)⁺, 359,254 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0649

10 ethyl 3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-yl-3-oxopropanoate

[1453] MS (ESI, Pos.20V) : 473 (M + H)⁺, 359,237 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.94.

15 Example 11-0650

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(4-butoxybenzoyl)-1,4'-bipiperidin-3-amine

20 **[1454]** MS (ESI, Pos.20V) : 535 (M + H)⁺, 359, 177;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0651

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(benzyloxy)acetyl]-1,4'-bipiperidin-3-amine

[1455] MS (ESI, Pos.20V) : 507 (M + H)⁺, 417;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0652

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N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-methylbutanoyl)-1,4'-bipiperidin-3-amine

[1456] MS (ESI, Pos.20V) : 443 (M + H)⁺, 359, 193;
HPLC condition : A; HPLC retention time (min) : 3.01.

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Example 11-0653

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-methoxyphenyl)acetyl]-1,4'-bipiperidin-3-amine

40 **[1457]** MS (ESI, Pos.20V) : 507 (M + H)⁺, 359, 254 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0654

45 ethyl 5-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-yl-5-oxopentanoate

[1458] MS (ESI, Pos.20V) : 501 (M + H)⁺, 251 (M + 2H)²⁺, 228;
HPLC condition : A; HPLC retention time (min) 3.01.

50 Example 11-0655

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(cyclobutylcarbonyl)-1,4'-bipiperidin-3-amine

55 **[1459]** MS (ESI, Pas.20V) : 441 (M + H)⁺, 359, 193;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0656

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-ethylbutanoyl)-1,4'-bipiperidin-3-amine

5 [1460] MS (ESI, Pos.20V) : 457 (M + H)⁺, 359;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0657

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[4-(trifluoromethoxy)benzoyl]-1,4'-bipiperidin-3-amine

[1461] MS (ESI, Pos.20V) : 547 (M + H)⁺, 359, 189;
HPLC condition : A; HPLC retention time (min) : 3.22.

15 Example 11-0658

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(methylsulfonyl)-1,4'-bipiperidin-3-amine

20 [1462] MS (ESI, Pos.20V): 437 (M + H)⁺, 276, 219 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.92.

Example 11-0659

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(pentylsulfonyl)-1,4'-bipiperidin-3-amine

[1463] MS (ESI, Pos.20V) : 985 (2M + H)⁺, 493 (M + H)⁺, 247 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0660

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(propylsulfonyl)-1,4'-bipiperidin-3-amine

[1464] MS (ESI, Pos.20V) : 929 (2M + H)⁺, 465 (M + H)⁺, 233 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

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Example 11-0661

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(isopropylsulfonyl)-1,4'-bipiperidin-3-amine

40 [1465] MS (ESI, Pos.20V) : 929 (2M + H)⁺, 465 (M + H)⁺, 233 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0662

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1,4'-bipiperidin-3-amine

[1466] MS (ESI, Pos.20V) : 359 (M + H)⁺, 276, 180 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.83.

50 Example 11-0663

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(butylsulfonyl)-1,4'-bipiperidin-3-amine

55 [1467] MS (ESI, Pos.20V) : 957 (2M + H)⁺, 479 (M + H)⁺, 240 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0664

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(phenylsulfonyl)-1,4'-bipiperidin-3-amine

5 **[1468]** MS (ESI, Pos.20V) : 997 (2M + H)⁺, 499 (M + H)⁺, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0665

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-chlorophenyl)sulfonyl]-1,4'-bipiperidin-3-amine

[1469] MS (ESI, Pos.20V) : 535, 533 (M + H)⁺, 267 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

15 Example 11-0666

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[4-(trifluoromethyl)phenyl]sulfonyl-1,4'-bipiperidin-3-amine

20 **[1470]** MS (ESI, Pos.20V) : 567 (M + H)⁺, 284 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0667

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-methoxyphenyl)sulfonyl]-1,4'-bipiperidin-3-amine

25 **[1471]** MS (ESI, Pos.20V) : 529 (M + H)⁺, 359, 265 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0668

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N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(benzylsulfonyl)-1,4'-bipiperidin-3-amine

[1472] MS (ESI, Pos.20V) : 513 (M + H)⁺, 359;
HPLC condition : A; HPLC retention time (min) : 3.14.

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Example 11-0669

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-methylphenyl)sulfonyl]-1,4'-bipiperidin-3-amine

40 **[1473]** MS (ESI, Pos.20V) : 513 (M + H)⁺, 276, 257 (M + 2H)²⁺, 238;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0670

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N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(3-methylphenyl)sulfonyl]-1,4'-bipiperidin-3-amine

[1474] MS (ESI, Pos.20V) : 513 (M + H)⁺, 276, 257 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

50 Example 11-0671

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(2-methylphenyl)sulfonyl]-1,4'-bipiperidin-3-amine

55 **[1475]** MS (ESI, Pos.20V) : 513 (M + H)⁺, 276, 257 (M + 2H)²⁺, 238;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0672

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[4-(trifluoromethoxy)phenyl]sulfonyl-1,4'-bipiperidin-3-amine

5 [1476] MS (ESI, Pos.20V) : 583 (M + H)⁺, 292 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.33.

Example 11-0673

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-butoxyphenyl)sulfonyl]-1,4'-bipiperidin-3-amine

[1477] MS (ESI, Pos.20V) : 571 (M + H)⁺, 359, 286 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.38.

15 Example 11-0674

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-tert-butylphenyl)sulfonyl]-1,4'-bipiperidin-3-amine

20 [1478] MS (ESI, Pos.24V) : 555 (M + H)⁺, 278 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.38.

Example 11-0675

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-nitrophenyl)sulfonyl]-1,4'-bipiperidin-3-amine

25 [1479] MS (ESI, Pos.20V) : 544 (M + H)⁺, 292;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0676

30 4-(3 -[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-ylsulfonyl)benzonitrile

[1480] MS (ESI, Pos.20V) : 524 (M + H)⁺, 262.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

35 Example 11-0677

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(2-naphthylsulfonyl)-1,4'-bipiperidin-3-amine

40 [1481] MS (ESI, Pos.20V) : 549 (M + H)⁺, 275 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0678

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-isobutyrylpiperidin-3-yl)azepan-3-amine

[1482] MS (ESI, Pos.20V) : 443 (M + H)⁺, 373, 290, 222(M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

50 Example 11-0679

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-butyrylpiperidin-3-yl)azepan-3-amine

55 [1483] MS (ESI, Pos.20V) : 443 (M + H)⁺, 290, 222(M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

EP 1 571 146 A1

Example 11-0680

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-methylbenzoyl)piperidin-3-yl]azepan-3-amine

5 [1484] MS (ESI, Pos.20V) : 491 (M + H)⁺, 373, 246 (M + 2H)²⁺, 119;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0681

10 1-(1-acetylpiperidin-3-yl)-N-(4-azepan-1-ylpyrimidin-2-yl)azepan-3-amine

[1485] MS (ESI, Pos.20V) : 415 (M + H)⁺, 373, 290, 208 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.92.

15 Example 11-0682

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-fluorobenzoyl)piperidin-3-yl]azepan-3-amine

20 [1486] MS (ESI, Pos.20V) : 495 (M+H)⁺, 373, 248 (M + 2H)²⁺, 130;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0683

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-methylbenzoyl)piperidin-3-yl]azepan-3-amine

25 [1487] MS (ESI, Pos.20V) : 491 (M + H)⁺, 373, 246 (M + 2H)²⁺, 119;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0684

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-heptanoylpiperidin-3-yl)azepan-3-amine

[1488] MS (ESI, Pos.20V) : 485 (M + H)⁺, 290, 243 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

35 Example 11-0685

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-methoxybenzoyl)piperidin-3-yl]azepan-3-amine

40 [1489] MS (ESI, Pos.20V) : 507 (M + H)⁺, 373, 254 (M + 2H)²⁺, 135;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0686

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-methylbenzoyl)piperidin-3-yl]azepan-3-amine

[1490] MS (ESI, Pos.20V) : 491 (M + H)⁺, 373, 246 (M + 2H)²⁺, 119;
HPLC condition : A; HPLC retention time (min) : 3.11.

50 Example 11-0687

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-hexanoylpiperidin-3-yl)azepan-3-amine

55 [1491] MS (ESI, Pos.20V) : 471 (M + H)⁺, 373, 290, 236 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0688

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(phenylacetyl)piperidin-3-yl]azepan-3-amine

5 [1492] MS (ESI, Pos.20V) : 491 (M + H)⁺, 290, 246 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0689

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-methoxybenzoyl)piperidin-3-yl]azepan-3-amine

[1493] MS (ESI, Pos.20V) : 507 (M + H)⁺, 373, 254 (M + 2H)²⁺, 135;
HPLC condition : A; HPLC retention time (min) : 3.11.

15 Example 11-0690

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[(2E)-3-phenylprop-2-enoyl]piperidin-3-ylazepan-3-amine

20 [1494] MS (ESI, Pos.20V) : 503 (M + H)⁺, 373, 252 (M + 2H)²⁺, 131;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0691

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-propionylpiperidin-3-yl)azepan-3-amine

25 [1495] MS (ESI, Pos.20V) : 429 (M + H)⁺, 290, 215 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0692

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclopropylcarbonyl)piperidin-3-yl]azepan-3-amine

[1496] MS (ESI, Pos.20V) : 441 (M + H)⁺, 373, 290, 221 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

35 Example 11-0693

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-chlorobenzoyl)piperidin-3-yl]azepan-3-amine

40 [1497] MS (ESI, Pos.20V) : 513, 511 (M + H)⁺, 256 (M + 2H)²⁺;
HPLC condition ; A; HPLC retention time (min) : 3.11.

Example 11-0694

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclohexylcarbonyl)piperidin-3-yl]azepan-3-amine

[1498] MS (ESI, Pos.20V) : 483 (M + H)⁺, 373, 242 (M + 2H)²⁺, 111;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 11-0695

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-furoyl)piperidin-3-yl]azepan-3-amine

55 [1499] MS (ESI, Pos.20V) : 467 (M + H)⁺, 290, 234 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0696

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-pentanoylpiperidin-3-yl)azepan-3-amine

5 [1500] MS (ESI, Pos.20V) : 457 (M + H)⁺, 290, 229 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0697

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(phenoxyacetyl)piperidin-3-yl]azepan-3-amine

[1501] MS (ESI, Pos.20V) : 507, (M + H)⁺, 457, 290, 254 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

15 Example 11-0698

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-octanoylpiperidin-3-yl)azepan-3-amine

20 [1502] MS (ESI, Pos.20V) : 499 (M + H)⁺, 373, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.36.

Example 11-0699

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-phenylpropanoyl)piperidin-3-yl]azepan-3-amine

25 [1503] MS (ESI, Pos.20V) : 505 (M + H)⁺, 253 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min): 3.18.

Example 11-0700

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[2-(trifluoromethyl)benzoyl]piperidin-3-ylazepan-3-amine

[1504] MS (ESI, Pos.20V) : 545 (M + H)⁺, 273 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.18.

35 Example 11-0701

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-naphthoyl)piperidin-3-yl]azepan-3-amine

40 [1505] MS (ESI, Pos.20V) : 527 (M + H)⁺, 373, 264 (M + 2H)²⁺, 155;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0702

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(thien-2-ylacetyl)piperidin-3-yl]azepan-3-amine

[1506] MS (ESI, Pos.20V) : 497 (M + H)⁺, 290, 249 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

50 Example 11-0703

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3,3-dimethylbutanoyl)piperidin-3-yl]azepan-3-amine

55 [1507] MS (ESI, Pos.20V) : 471 (M + H)⁺, 373, 236 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0704

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-methoxybenzoyl)piperidin-3-yl]azepan-3-amine

5 [1508] MS (ESI, Pos.20V) : 507 (M + H)⁺, 373, 254 (M + 2H)²⁺, 135;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0705

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-ethylhexanoyl)piperidin-3-yl]azepan-3-amine

[1509] MS (ESI, Pos.20V) : 499 (M + H)⁺, 373, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

15 Example 11-0706

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-fluorobenzoyl)piperidin-3-yl]azepan-3-amine

20 [1510] MS (ESI, Pos.20V) : 495 (M + H)⁺, 290, 248 (M + 2H)²⁺, 206;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0707

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-chlorobenzoyl)piperidin-3-yl]azepan-3-amine

25 [1511] MS (ESI, Pos.20V) : 513, 511 (M + H)⁺, 290, 256 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0708

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-tert-butylbenzoyl)piperidin-3-yl]azepan-3-amine

[1512] MS (ESI, Pos.20V) : 533 (M + H)⁺, 373, 267 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.34.

35

Example 11-0749

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(thien-2-ylcarbonyl)piperidin-3-yl]azepan-3-amine

40 [1513] MS (ESI, Pos.20V) : 483 (M + H)⁺, 373, 242 (M + 2H)²⁺, 111;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0710

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-chlorophenyl)acetyl]piperidin-3-ylazepan-3-amine

[1514] MS (ESI, Pos.20V) : 527, 525 (M + H)⁺, 263 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

50 Example 11-0711

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-methylbutanoyl)piperidin-3-yl]azepan-3-amine

55 [1515] MS (ESI, Pos.20V) : 457 (M + H)⁺, 373, 290, 229 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.49.

Example 11-0712

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[4-(trifluoromethyl)benzoyl]piperidin-3-ylazepan-3-amine

5 **[1516]** MS (ESI, Pos.20V): 545 (M + H)⁺, 273 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 11-0713

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-benzoylpiperidin-3-yl)azepan-3-amine

[1517] MS (ESI, Pos.20V) : 477 (M + H)⁺, 373, 239 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

15 Example 11-0714

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-fluorobenzoyl)piperidin-3-yl]azepan-3-amine

20 **[1518]** MS (ESI, Pos.20V) : 495 (M + H)⁺, 290, 248 (M + 2H)²⁺, 206;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0715

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(diphenylacetyl)piperidin-3-yl]azepan-3-amine

25 **[1519]** MS (ESI, Pos.20V) : 567 (M + H)⁺, 373, 284, (M + 2H)²⁺, 167;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-0716

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-phenoxypropanoyl)piperidin-3-yl]azepan-3-amine

[1520] MS (ESI, Pos.20V) : 521 (M + H)⁺, 261 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

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Example 11-0717

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-methylpentanoyl)piperidin-3-yl]azepan-3-amine

40 **[1521]** MS (ESI, Pos.20V) : 471 (M + H)⁺, 373, 236 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0718

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(methoxyacetyl)piperidin-3-yl]azepan-3-amine

[1522] MS (ESI, Pos.20V) : 445 (M + H)⁺, 373, 290, 223 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.92.

50 Example 11-0719

ethyl 4-(3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)-4-oxobutanoate

55 **[1523]** MS (ESI, Pos.20V) : 501 (M + H)⁺, 251 (M + 2H)²⁺, 228;
HPLC condition : A; HPLC retention time (min) : 3.05.

EP 1 571 146 A1

Example 11-0720

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-cyclopentylpropanoyl)piperidin-3-yl]azepan-3-amine

- 5 **[1524]** MS (ESI, Pos.20V) : 497 (M + H)⁺, 373, 249 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0721

- 10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-propylpentanoyl)piperidin-3-yl]azepan-3-amine

[1525] MS (ESI, Pos.20V) : 499 (M + H)⁺, 373, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

- 15 Example 11-0722

methyl 5-(3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)-5-oxopentanoate

- 20 **[1526]** MS (ESI, Pos.20V) : 501 (M + H)⁺, 235;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0723

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-chlorophenoxy)acetyl]piperidin-3-ylazepan-3-amine

- 25 **[1527]** MS (ESI, Pos.20V) : 543, 541 (M + H)⁺, 271 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0725

- 30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclopentylacetyl)piperidin-3-yl]azepan-3-amine

[1528] MS (ESI, Pos.20V) : 483 (M + H)⁺, 373, 242 (M + 2H)²⁺, 111;
HPLC condition : A; HPLC retention time (min) : 3.20.

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Example 11-0726

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclopentylcarbonyl)piperidin-3-yl]azepan-3-amine

- 40 **[1529]** MS (ESI, Pos.20V) : 469 (M + H)⁺, 373, 235 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0727

- 45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(mesitylcarbonyl)piperidin-3-yl]azepan-3-amine

[1530] MS (ESI, Pos.20V) : 519 (M + H)⁺, 373, 147;
HPLC condition : A; HPLC retention time (min) : 3.25.

- 50 Example 11-0728

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(3-methoxyphenyl)acetyl]piperidin-3-ylazepan-3-amine

- 55 **[1531]** MS (ESI, Pos.20V) : 521 (M + H)⁺, 261 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0729

ethyl 3-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)-3-oxopropanoate

5 **[1532]** MS (ESI, Pos.20V) : 487 (M + H)⁺, 290, 244 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.03.

Example 11-0730

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-butoxybenzoyl)piperidin-3-yl]azepan-3-amine

[1533] MS (ESI, Pos.20V) : 549 (M + H)⁺, 373, 177;
HPLC condition : A; HPLC retention time (min) : 3.34.

15 Example 11-0731

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(benzyloxy)acetyl]piperidin-3-ylazepan-3-amine

20 **[1534]** MS (ESI, Pos.20V) : 521 (M + H)⁺, 431;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0732

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-methylbutanoyl)piperidin-3-yl]azepan-3-amine

25 **[1535]** MS (ESI, Pos.20V) : 457 (M + H)⁺, 373, 290, 229 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0733

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-methoxyphenyl)acetyl]piperidin-3-ylazepan-3-amine

[1536] MS (ESI, Pos.20V) : 521 (M + H)⁺, 261 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.11.

35 Example 11-0734

ethyl 5-(3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)-5-oxopentanoate

40 **[1537]** MS (ESI, Pos.20V) : 515 (M + H)⁺, 235;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0735

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclobutylcarbonyl)piperidin-3-yl]azepan-3-amine

[1538] MS (ESI, Pos.20V) : 455 (M + H)⁺, 373, 290, 228 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

50 Example 11-0736

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-ethylbutanoyl)piperidin-3-yl]azepan-3-amine

55 **[1539]** MS (ESI, Pos.20V) : 471 (M + H)⁺, 373, 236 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0737

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[4-(trifluoromethoxy)benzoyl]piperidin-3-ylazepan-3-amine

5 [1540] MS (ESI, Pos.20V) : 561 (M + H)⁺, 373, 281 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0735

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(methylsulfonyl)piperidin-3-yl]azepan-3-amine

[1541] MS (ESI, Pos.20V) : 451 (M + H)⁺, 373, 290, 226 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

15 Example 11-0739

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(pentylsulfonyl)piperidin-3-yl]azepan-3-amine

20 [1542] MS (ESI, Pos.20V) : 507 (M + H)⁺, 290, 254 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 11-0740

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(propylsulfonyl)piperidin-3-yl]azepan-3-amine

25 [1543] MS (ESI, Pos.20V) : 479 (M + H)⁺, 290, 240 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0741

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(isopropylsulfonyl)piperidin-3-yl]azepan-3-amine

[1544] MS (ESI, Pos.20V) : 479 (M + H)⁺, 290, 240 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

35 Example 11-0742

N-(4-azepan-1-ylpyrimidin-2-yl)-1-piperidin-3-ylazepan-3-amine

40 [1545] MS (ESI, Pos.20V) : 745 (2M + H)⁺, 373 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 2.89.

Example 11-0743

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(butylsulfonyl)piperidin-3-yl]azepan-3-amine

[1546] MS (ESI, Pos.20V) : 493 (M + H)⁺, 290, 247 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 11-0744

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(phenylsulfonyl)piperidin-3-yl]azepan-3-amine

55 [1547] MS (ESI, Pos.20V) : 513 (M + H)⁺, 290, 257 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0745

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-chlorophenyl)sulfonyl]piperidin-3-ylazepan-3-amine

5 [1548] MS (ESI, Pos.20V) : 549, 547 (M + H)⁺, 274 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0746

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-(trifluoromethyl)phenyl)sulfonyl]piperidin-3-ylazepan-3-amine

[1549] MS (ESI, Pos.20V) : 581 (M + H)⁺, 291 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.33.

15 Example 11-0747

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-methoxyphenyl)sulfonyl]piperidin-3-ylazepan-3-amine

20 [1550] MS (ESI, Pos.20V) : 543 (M + H)⁺, 272 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0748

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(benzylsulfonyl)piperidin-3-yl]azepan-3-amine

25 [1551] MS (ESI, Pos.20V) : 527 (M + H)⁺, 373, 264 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0749

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-methylphenyl)sulfonyl]piperidin-3-ylazepan-3-amine

[1552] MS (ESI, Pos.20V) : 527 (M + H)⁺, 290, 264 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.21.

35

Example 11-0750

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(3-methylphenyl)sulfonyl]piperidin-3-ylazepan-3-amine

40 [1553] MS (ESI, Pos.20V) : 527 (M + H)⁺, 290, 264 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0751

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(2-methylphenyl)sulfonyl]piperidin-3-ylazepan-3-amine

[1554] MS (ESI, Pos.20V) : 527 (M + H)⁺, 290, 264 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

50 Example 11-0752

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-(trifluoromethoxy)phenyl)sulfonyl]piperidin-3-ylazepan-3-amine

55 [1555] MS (ESI, Pos.20V) : 597 (M + H)⁺, 299 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.36.

Example 11-0753

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-butoxyphenyl)sulfonyl]piperidin-3-ylazepan-3-amine

5 **[1556]** MS (ESI, Pos.20V) : 585 (M + H)⁺, 293 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.44.

Example 11-0754

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-tert-butylphenyl)sulfonyl]piperidin-3-ylazepan-3-amine

[1557] MS (ESI, Pos.20V) : 569 (M + H)⁺, 285 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.42.

15 Example 11-4755

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-nitrophenyl)sulfonyl]piperidin-3-ylazepan-3-amine

20 **[1558]** MS (ESI, Pos.20V) : 558 (M + H)⁺, 279.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 11-0756

25 4-[(3-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)sulfonyl]benzonitrile

[1559] MS (ESI, Pos.20V) : 538 (M + H)⁺, 269.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0757

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-naphthylsulfonyl)piperidin-3-yl]azepan-3-amine

[1560] MS (ESI, Pos.20V) : 563 (M + H)⁺, 282 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

35 Example 11-0758

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-isobutyrylpiperidin-4-yl)azepan-3-amine

40 **[1561]** MS (ESI, Pos.20V) : 443 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0759

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-butyrylpiperidin-4-yl)azepan-3-amine

[1562] MS (ESI, Pos.20V) : 443 (M + H)⁺, 373, 187;
HPLC condition : A; HPLC retention time (min) : 3.00.

50 Example 11-0760

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-methylbenzoyl)piperidin-4-yl]azepan-3-amine

55 **[1563]** MS (ESI, Pos.20V) : 491 (M + H)⁺, 373, 119;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0761

1-(1-acetylpiperidin-4-yl)-N-(4-azepan-1-ylpyrimidin-2-yl)azepan-3-amine

5 **[1564]** MS (ESI, Pos.20V) : 415 (M + H)⁺, 373, 290, 187;
HPLC condition : A; HPLC retention time (min) : 2.89.

Example 11-0762

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-fluorobenzoyl)piperidin-4-yl]azepan-3-amine

[1565] MS (ESI, Pos.20V) : 495 (M + H)⁺, 373, 123;
HPLC condition : A; HPLC retention time (min) : 3.07.

15 Example 11-0763

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-methylbenzoyl)piperidin-4-yl]azepan-3-amine

20 **[1566]** MS (ESI, Pos.20V) : 491 (M + H)⁺, 373, 119;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0764

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-heptanoylpiperidin-4-yl)azepan-3-amine

25 **[1567]** MS (ESI, Pos.20V) : 485 (M + H)⁺, 373, 243 (M + 2H)²⁺, 187;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0765

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-methoxybenzoyl)piperidin-4-yl]azepan-3-amine

[1568] MS (ESI, Pos.20V) : 507 (M + H)⁺, 373, 135;
HPLC condition : A; HPLC retention time (min) : 3.05.

35 Example 11-0766

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-methylbenzoyl)piperidin-4-yl]azepan-3-amine

40 **[1569]** MS (ESI, Pos.20V) : 981 (2M + H)⁺, 491 (M + H)⁺, 373, 119;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0767

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-hexanoylpiperidin-4-yl)azepan-3-amine

[1570] MS (ESI, Pos.20V) : 471 (M + H)⁺, 373, 236 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

50 Example 11-0768

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(phenylacetyl)piperidin-4-yl]azepan-3-amine

55 **[1571]** MS (ESI, Pos.20V) : 491 (M + H)⁺, 373, 246 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0769

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-methoxybenzoyl)piperidin-4-yl]azepan-3-amine

5 **[1572]** MS (ESI, Pos.20V) : 507 (M + H)⁺, 373, 135;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0770

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(2E)-3-phenylprop-2-enoyl]piperidin-4-ylazepan-3-amine

[1573] MS (ESI, Pos.20V) : 503 (M + H)⁺, 373, 131;
HPLC condition : A; HPLC retention time (min) : 3.14.

15 Example 11-0771

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-propionylpiperidin-4-yl)azepan-3-amine

20 **[1574]** MS (ESI, Pos.20V) : 429 (M + H)⁺, 373, 215 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.94.

Example 11-0772

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclopropylcarbonyl)piperidin-4-yl]azepan-3-amine

25 **[1575]** MS (ESI, Pos.20V) : 441 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0773

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-chlorobenzoyl)piperidin-4-yl]azepan-3-amine

[1576] MS (ESI, Pos.20V) : 513, 511 (M + H)⁺, 373, 256 (M + 2H)²⁺, 139;
HPLC condition: A; HPLC retention time (min) : 3.07.

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Example 11-0774

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclohexylcarbonyl)piperidin-4-yl]azepan-3-amine

40 **[1577]** MS (ESI, Pos.20V) : 483 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0775

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-furoyl)piperidin-4-yl]azepan-3-amine

[1578] MS (ESI, Pos.20V) : 467 (M + H)⁺, 234 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.96.

50 Example 11-0776

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-pentanoylpiperidin-4-yl)azepan-3-amine

55 **[1579]** MS (ESI, Pos.20V) : 457 (M + H)⁺, 373, 187;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0777

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(phenoxyacetyl)piperidin-4-yl]azepan-3-amine

5 [1580] MS (ESI, Pos.20V) : 507 (M + H)⁺, 254 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0778

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-octanoylpiperidin-4-yl)azepan-3-amine

[1581] MS (ESI, Pos.20V) : 499 (M + H)⁺, 373, 250 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

15 Example 11-0779

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-phenylpropanoyl)piperidin-4-yl]azepan-3-amine

20 [1582] MS (ESI, Pos.20V) : 505 (M + H)⁺, 373, 253 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0780

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[2-(trifluoromethyl)benzoyl]piperidin-4-ylazepan-3-amine

[1583] MS (ESI, Pos.20V) : 545 (M + H)⁺, 373, 273 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0781

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-naphthoyl)piperidin-4-yl]azepan-3-amine

[1584] MS (ESI, Pos.20V) : 527 (M + H)⁺, 373, 155;
HPLC condition : A; HPLC retention time (min) : 3.18.

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Example 11-0782

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(thien-2-ylacetyl)piperidin-4-yl]azepan-3-amine

40 [1585] MS (ESI, Pos.20V) : 497 (M + H)⁺, 249 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0783

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3,3-dimethylbutanoyl)piperidin-4-yl]azepan-3-amine

[1586] MS (ESI, Pos.20V) : 471 (M + H)⁺, 373, 187;
HPLC condition : A; HPLC retention time (min) : 3.09.

50 Example 11-0784

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-methoxybenzoyl)piperidin-4-yl]azepan-3-amine

55 [1587] MS (ESI, Pos.20V) : 507 (M + H)⁺, 373, 135;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0785

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-ethylhexanoyl)piperidin-4-yl]azepan-3-amine

5 **[1588]** MS (ESI, Pos.20V) : 499 (M + H)⁺, 373;
HPLC condition: A; HPLC retention time (min) : 3.22.

Example 11-0786

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-fluorobenzoyl)piperidin-4-yl]azepan-3-amine

[1589] MS (ESI, Pos.20V) : 495 (M + H)⁺, 373, 248 (M + 2H)²⁺, 123;
HPLC condition : A; HPLC retention time (min) : 3.07.

15 Example 11-0787

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-chlorobenzoyl)piperidin-4-yl]azepan-3-amine

20 **[1590]** MS (ESI, Pos.20V) : 513, 511 (M + H)⁺, 373, 256 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0788

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-tert-butylbenzoyl)piperidin-4-yl]azepan-3-amine

25 **[1591]** MS (ESI, Pos.20V) : 533 (M + H)⁺, 373, 161;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0789

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(thien-2-ylcarbonyl)piperidin-4-yl]azepan-3-amine

[1592] MS (ESI, Pos.20V) : 483 (M + H)⁺, 373, 111;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0790

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-[(4-chlorophenyl)acetyl]piperidin-4-yl]azepan-3-amine

40 **[1593]** MS (ESI, Pos.20V) : 527, 525 (M + H)⁺, 263 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0791

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-methylbutanoyl)piperidin-4-yl]azepan-3-amine

[1594] MS (ESI, Pos.20V) : 457 (M + H)⁺, 373, 187;
HPLC condition : A; HPLC retention time (min) : 3.03.

50 Example 11-0792

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-[4-(trifluoromethyl)benzoyl]piperidin-4-yl]azepan-3-amine

55 **[1595]** MS (ESI, Pos.20V) : 545 (M + H)⁺, 273 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.19.

Example 11-0793

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-benzoylpiperidin-4-yl)azepan-3-amine

5 **[1596]** MS (ESI, Pos.20V) : 477 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0794

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-fluorobenzoyl)piperidin-4-yl]azepan-3-amine

[1597] MS (ESI, Pos.20V) : 495 (M + H)⁺, 373, 248 (M + 2H)²⁺, 123;
HPLC condition : A; HPLC retention time (min) : 3.05.

15 Example 11-0795

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(diphenylacetyl)piperidin-4-yl]azepan-3-amine

20 **[1598]** MS (ESI, Pos.20V) : 567 (M + H)⁺, 373, 284 (M + 2H)²⁺, 167;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0796

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-phenoxypropanoyl)piperidin-4-yl]azepan-3-amine

25 **[1599]** MS (ESI, Pos.20V) : 521 (M + H)⁺, 373, 261 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0797

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-methylpentanoyl)piperidin-4-yl]azepan-3-amine

[1600] MS (ESI, Pos.20V) : 471 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 3.11.

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Example 11-0798

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(methoxyacetyl)piperidin-4-yl]azepan-3-amine

40 **[1601]** MS (ESI, Pos.20V) : 445 (M + H)⁺, 373, 290, 223 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.90.

Example 11-0799

45 ethyl 4-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)-4-oxobutanoate

[1602] MS (ESI, Pos.20V) : 501 (M + H)⁺, 251 (M + 2H)²⁺, 228;
HPLC condition : A;
HPLC retention time (min) : 3.01.

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Example 11-0800

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(3-cyclopentylpropanoyl)piperidin-4-yl]azepan-3-amine

55 **[1603]** MS (ESI, Pos.20V) : 497 (M + H)⁺, 373, 249 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

EP 1 571 146 A1

Example 11-0801

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-propylpentanoyl)piperidin-4-yl]azepan-3-amine

5 **[1604]** MS (ESI, Pos.20V): 499 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0802

10 methyl 5-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)-5-oxopentanoate

[1605] MS (ESI, Pos.20V) : 501 (M + H)⁺, 235;
HPLC condition : A; HPLC retention time (min) : 2.98.

15 Example 11-0803

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-[(4-chlorophenoxy)acetyl]piperidin-4-yl]azepan-3-amine

20 **[1606]** MS (ESI, Pos.20V) : 543, 541 (M + H)⁺, 271 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0805

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclopentylacetyl)piperidin-4-yl]azepan-3-amine

25 **[1607]** MS (ESI, Pos.20V) : 483 (M + H)⁺, 373, 242 (M + 2H)²⁺, 187;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0806

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclopentylcarbonyl)piperidin-4-yl]azepan-3-amine

[1608] MS (ESI, Pos.20V) : 469 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 3.07.

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Example 11-0807

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(mesitylcarbonyl)piperidin-4-yl]azepan-3-amine

40 **[1609]** MS (ESI, Pos.20V) : 519 (M + H)⁺, 373, 147;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0808

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-[(3-methoxyphenyl)acetyl]piperidin-4-yl]azepan-3-amine

[1610] MS (ESI, Pos.20V) : 521 (M + H)⁺, 261 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.09.

50 Example 11-0809

ethyl 3-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)-3-oxopropanoate

55 **[1611]** MS (ESI, Pos.20V) : 487 (M + H)⁺, 373, 244 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0810

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-butoxybenzoyl)piperidin-4-yl]azepan-3-amine

5 **[1612]** MS (ESI, Pos.20V) : 549 (M + H)⁺, 373, 177;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-0811

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(benzyloxy)acetyl]piperidin-4-ylazepan-3-amine

[1613] MS (ESI, Pos.20V) : 521 (M + H)⁺, 431;
HPLC condition : A; HPLC retention time (min) : 3.12.

15 Example 11-0812

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-methylbutanoyl)piperidin-4-yl]azepan-3-amine

20 **[1614]** MS (ESI, Pos.20V) : 457 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0813

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-methoxyphenyl)acetyl]piperidin-4-ylazepan-3-amine

25 **[1615]** MS (ESI, Pos.20V) : 521 (M + H)⁺, 373, 261 (M + 2H)²⁺, 121;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0814

30 ethyl 5-(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)-5-oxopentanoate

[1616] MS (ESI, Pos.20V) : 515 (M + H)⁺, 235;
HPLC condition : A; HPLC retention time (min) : 3.05.

35 Example 11-0815

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(cyclobutylcarbonyl)piperidin-4-yl]azepan-3-amine

40 **[1617]** MS (ESI, Pos.20V) : 455 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0816

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-ethylbutanoyl)piperidin-4-yl]azepan-3-amine

[1618] MS (ESI, Pos.20V) : 471 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 3.09.

50 Example 11-0817

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[4-(trifluoromethoxy)benzoyl]piperidin-4-ylazepan-3-amine

55 **[1619]** MS (ESI, Pos.20V) : 561 (M + H)⁺, 373, 274;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0818

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(methylsulfonyl)piperidin-4-yl]azepan-3-amine

- 5 **[1620]** MS (ESI, Pos.20V) : 901 (2M + H)⁺, 451 (M + H)⁺, 226 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0819

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(pentylsulfonyl)piperidin-4-yl]azepan-3-amine

- [1621]** MS (ESI, Pos.20V) : 507 (M + H)⁺, 373, 254 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.23.

15 Example 11-0820

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(propylsulfonyl)piperidin-4-yl]azepan-3-amine

- 20 **[1622]** MS (ESI, Pos.20V) : 957 (2M + H)⁺, 479 (M + H)⁺, 240 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0821

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(isopropylsulfonyl)piperidin-4-yl]azepan-3-amine

- 25 **[1623]** MS (ESI, Pos.20V): 957 (2M + H)⁺, 479 (M + H)⁺, 240 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0822

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-piperidin-4-ylazepan-3-amine

- [1624]** MS (ESI, Pos.20V) : 373 (M + H)⁺, 290, 187 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.87.

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Example 11-0823

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(butylsulfonyl)piperidin-4-yl]azepan-3-amine

- 40 **[1625]** MS (ESI, Pos.20V) : 985 (2M + H)⁺, 493 (M + H)⁺, 247 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0824

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(phenylsulfonyl)piperidin-4-yl]azepan-3-amine

- [1626]** MS (ESI, Pos.20V) : 513 (M + H)⁺, 290, 257 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 11-0825

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(4-chlorophenyl)sulfonyl]piperidin-4-ylazepan-3-amine

- 55 **[1627]** MS (ESI, Pos.20V) : 549, 547 (M + H)⁺, 274 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0826

N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-[4-(trifluoromethyl)phenyl]sulfonylpiperidin-4-yl)azepan-3-amine

- 5 **[1628]** MS (ESI, Pos.20V) : 581 (M + H)⁺, 291 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.33.

Example 11-0827

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-methoxyphenyl)sulfonyl]piperidin-4-ylazepan-3-amine

- [1629]** MS (ESI, Pos.20V) : 543 (M + H)⁺, 373, 272 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

15 Example 11-0828

N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(benzylsulfonyl)piperidin-4-yl]azepan-3-amine

- 20 **[1630]** MS (ESI, Pos.20V) : 527 (M + H)⁺, 373;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0829

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-methylphenyl)sulfonyl]piperidin-4-ylazepan-3-amine

- [1631]** MS (ESI, Pos.20V) : 527 (M + H)⁺, 264 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0830

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(3-methylphenyl)sulfonyl]piperidin-4-ylazepan-3-amine

- [1632]** MS (ESI, Pos.20V) : 527 (M + H)⁺, 264 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

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Example 11-0831

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(2-methylphenyl)sulfonyl]piperidin-4-ylazepan-3-amine

- 40 **[1633]** MS (ESI, Pos.24V) : 527 (M + H)⁺, 290, 264 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0832

45 N-(4-azepan-1-ylpyrimidin-2-yl)-1-(1-[4-(trifluoromethoxy)phenyl]sulfonylpiperidin-4-yl)azepan-3-amine

- [1634]** MS (ESI, Pos.20V) : 597 (M + H)⁺, 299 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.34.

50 Example 11-0833

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-butoxyphenyl)sulfonyl]piperidin-4-ylazepan-3-amine

- 55 **[1635]** MS (ESI, Pos.20V) : 585 (M + H)⁺, 373, 293 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

Example 11-0834

N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-tert-butylphenyl)sulfonyl]piperidin-4-ylazepan-3-amine

5 [1636] MS (ESI, Pos.24V) : 569 (M + H)⁺, 285 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

Example 11-0835

10 N-(4-azepan-1-ylpyrimidin-2-yl)-1-1-[(4-nitrophenyl)sulfonyl]piperidin-4-ylazepan-3-amine

[1637] MS (ESI, Pos.20V) : 558 (M + H)⁺, 279.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

15 Example 11-0836

4-[(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azepan-1-ylpiperidin-1-yl)sulfonyl]benzonitrile

20 [1638] MS (ESI, Pos.20V) : 538 (M + H)⁺, 269.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0837

25 N-(4-azepan-1-ylpyrimidin-2-yl)-1-[1-(2-naphthylsulfonyl)piperidin-4-yl]azepan-3-amine

[1639] MS (ESI, Pos.20V) : 563 (M + H)⁺, 282 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-0838

30 4-azepan-1-yl-N-1-[(1-methyl-1H-pyrrol-2-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1640] MS (ESI, Pos. 20 V) : 341 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 2.98.

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Example 11-0839

4-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)-1,5-dimethyl-2-phenyl-1,2-dihydro-3H-pyrazole-3-one

40 [1641] MS (ESI, Pos. 20 V) : 895 (2M + H)⁺, 448 (M + H)⁺, 290, 201;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0840

45 4-azepan-1-yl-N-1-[1-(2-furylmethyl)azetidin-3-yl]pyrimidin-2-amine

[1642] MS (ESI, Pos. 20 V) : 328 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.94.

50 Example 11-0841

4-azepan-1-yl-N-1-[(5-methyl-2-furyl)methyl]azetidin-3-ylpyrimidin-2-amine

55 [1643] MS (ESI, Pos. 20 V) : 342 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0842

[5-(3-[(4-azepan-1-yl)pyrimidin-2-yl]amino)azetidin-1-ylmethyl)-2-furyl]methyl acetate MS (ESI, Pos. 20 V) : 400 (M + H)⁺, 290, 193;

[1644] HPLC condition : A; HPLC retention time (min) : 2.94.

Example 11-0843

[5-(3-[(4-azepan-1-yl)pyrimidin-2-yl]amino)azetidin-1-ylmethyl)-2-furyl]methanol

[1645] MS (ESI, Pos. 20 V) : 358 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 2.83.

Example 11-0844

4-azepan-1-yl-N-1-[(2E)-3-(2-furyl)prop-2-enyl]azetidin-3-ylpyrimidin-2-amine

[1646] MS (ESI, Pos. 20 V) : 354 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0845

4-azepan-1-yl-N-(1-benzylazetidin-3-yl)pyrimidin-2-amine

[1647] MS (ESI, Pos. 20 V) : 338 (M + H)⁺, 290, 248, 193;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0846

4-azepan-1-yl-N-[1-(2-methoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

[1648] MS (ESI, Pos. 20 V) : 368 (M + H)⁺, 248, 193;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0847

4-azepan-1-yl-N-[1-(2,3-dimethoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

[1649] MS (ESI, Pos. 20 V) : 795 (2M + H)⁺, 398 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0848

4-azepan-1-yl-N-[1-(2,4-dimethoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

[1650] MS (ESI, Pos. 20 V) : 795 (2M + H)⁺, 398 (M + H)⁺, 151;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0849

4-azepan-1-yl-N-[1-(2,4,6-trimethoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

[1651] MS (ESI, Pos. 20 V) : 855 (2M + H)⁺, 428 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0850

4-azepan-1-yl-N-[1-(2,5-dimethoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

5 [1652] MS (ESI, Pos. 20 V) : 795 (2M + H)⁺, 398 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0851

10 [2-(3-((4-azepan-1-ylpyrimidin-2-yl)amino)azetidin-1-ylmethyl)phenoxy]acetic acid MS (ESI, Pos. 20 V) : 412 (M + H)⁺,
290, 193;

[1653] HPLC condition : A; HPLC retention time (min) : 2.94.

15 Example 11-0852

4-azepan-1-yl-N-1-[2-(trifluoromethyl)benzyl]azetidin-3-ylpyrimidin-2-amine

[1654] MS (ESI, Pos. 20 V) : 406 (M + H)⁺;
20 HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0853

4-azepan-1-yl-N-[1-(2-methylbenzyl)azetidin-3-yl]pyrimidin-2-amine

25 [1655] MS (ESI, Pos. 20 V) : 352 (M + H)⁺, 276, 193;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0854

30 3-(3-((4-azepan-1-ylpyrimidin-2-yl)amino)azetidin-1-ylmethyl)benzonitrile

[1656] MS (ESI, Pos. 20 V) : 363 (M + H)⁺, 290, 193;
HPLC condition : A; HPLC retention time (min) : 3.00.

35 Example 11-0855

4-azepan-1-yl-N-[1-(3-fluorobenzyl)azetidin-3-yl]pyrimidin-2-amine

40 [1657] MS (ESI, Pos. 20 V) : 356 (M + H)⁺, 290, 193;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0856

45 4-azepan-1-yl-N-[1-(3-fluoro-4-methoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

[1658] MS (ESI, Pos. 20 V) : 771 (2M + H)⁺, 386 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.05.

50 Example 11-0857

4-azepan-1-yl-N-[1-(3-phenoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

55 [1659] MS (ESI, Pos. 20 V) : 859 (2M + H)⁺, 430 (M + H)⁺, 183;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0858

4-azepan-1-yl-N-[1-(3-methoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

5 [1660] MS (ESI, Pos. 20 V) : 368 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0859

10 4-azepan-1-yl-N-[1-(3,4-dimethoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

[1661] MS (ESI, Pos. 20 V): 795 (2M + H)⁺, 398 (M + H)⁺, 248, 193;
HPLC condition : A; HPLC retention time (min) : 3.00.

15 Example 11-0860

4-azepan-1-yl-N-[1-(3,4,5-trimethoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

20 [1662] MS (ESI, Pos. 20 V) : 855 (2M + H)⁺, 428 (M + H)⁺, 181;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0861

25 4-azepan-1-yl-N-1-[4-(benzyloxy)-3-methoxybenzyl]azetidin-3-ylpyrimidin-2-amine

[1663] MS (ESI, Pos. 20 V): 947 (2M + H)⁺, 474 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-0862

30 4-azepan-1-yl-N-1-[3-(benzyloxy)benzyl]azetidin-3-ylpyrimidin-2-amine

[1664] MS (ESI, Pos. 20 V) : 887 (2M + H)⁺, 444 (M + H)⁺, 197;
HPLC condition : A; HPLC retention time (min) : 3.23.

35 Example 11-0863

3-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)phenol

40 [1665] MS (ESI, Pos. 20 V) : 354 (M + H)⁺, 290, 193;
HPLC condition : A; HPLC retention time (min) : 2.94.

Example 11-0864

45 5-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)-2-methoxyphenol

[1666] MS (ESI, Pos. 20 V) : 384 (M + H)⁺, 290, 248, 137;
HPLC condition : A; HPLC retention time (min) : 2.90.

50 Example 11-0865

4-azepan-1-yl-N-1-[3-(trifluoromethyl)benzyl]azetidin-3-ylpyrimidin-2-amine

55 [1667] MS (ESI, Pos. 20 V) : 406 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0866

4-azepan-1-yl-N-[1-(3-methylbenzyl)azetidin-3-yl]pyrimidin-2-amine

5 **[1668]** MS (ESI, Pos. 20 V) : 352 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-4867

10 4-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)benzonitrile

[1669] MS (ESI, Pos. 20 V) : 363 (M + H)⁺, 290, 193;
HPLC condition : A; HPLC retention time (min) : 2.96.

15 Example 11-0868

4-azepan-1-yl-N-[1-(4-fluorobenzyl)azetidin-3-yl]pyrimidin-2-amine

20 **[1670]** MS (ESI, Pos. 20 V) : 356 (M + H)⁺, 263;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0869

25 N-[4-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)phenyl]acetamide

[1671] MS (ESI, Pos. 20 V) : 789 (2M + H)⁺, 395 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.89.

Example 11-0870

30 4-azepan-1-yl-N-1-[4-(dimethylamino)benzyl]azetidin-3-ylpyrimidin-2-amine

[1672] MS (ESI, Pos. 20 V) : 381 (M + H)⁺, 248, 191 (M + 2H)²⁺, 134;
HPLC condition : A; HPLC retention time (min) : 2.89.

35 Example 11-0871

4-azepan-1-yl-N-1-[4-(diethylamino)benzyl]azetidin-3-ylpyrimidin-2-amine

40 **[1673]** MS (ESI, Pos. 20 V) : 817 (2M + H)⁺, 409 (M + H)⁺, 205 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.85.

Example 11-0872

45 4-azepan-1-yl-N-[1-(4-phenoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

[1674] MS (ESI, Pos. 20 V) : 859 (2M + H)⁺, 430 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.27.

50 Example 11-0873

4-azepan-1-yl-N-[1-(4-methoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

55 **[1675]** MS (ESI, Pos. 20 V) : 368 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0874

4-azepan-1-yl-N-1-[4-(benzyloxy)benzyl]azetidin-3-ylpyrimidin-2-amine

5 **[1676]** MS (ESI, Pos. 20 V) : 887 (2M + H)⁺, 444 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0875

10 4-azepan-1-yl-N-[1-(1H-imidazol-2-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

[1677] MS (ESI, Pos. 20 V) : 328 (M + H)⁺, 248, 164.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.79.

15 Example 11-0876

4-azepan-1-yl-N-[1-(1-naphthylmethyl)azetidin-3-yl]pyrimidin-2-amine

20 **[1678]** MS (ESI, Pos. 20 V) : 775 (2M + H)⁺, 388 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0877

25 4-azepan-1-yl-N-1-[(4-methoxy-1-naphthyl)methyl]azetidin-3-ylpyrimidin-2-amine

[1679] MS (ESI, Pos. 20 V) : 418 (M + H)⁺, 248, 171;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0878

30 4-azepan-1-yl-N-1-[3,4-bis(benzyloxy)benzyl]azetidin-3-ylpyrimidin-2-amine

[1680] MS (ESI, Pos. 20 V) : 550 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.45.

35 Example 11-0879

4-azepan-1-yl-N-[1-(1H-pyrrol-2-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

40 **[1681]** MS (ESI, Pos. 20 V) : 327 (M + H)⁺, 248, 193;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0880

45 4-azepan-1-yl-N-[1-(thien-2-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

[1682] MS (ESI, Pos. 20 V) : 344 (M + H)⁺, 290, 248, 193;
HPLC condition : A; HPLC retention time (min) : 2.98.

50 Example 11-0881

4-azepan-1-yl-N-1-[(3-methylthien-2-yl)methyl]azetidin-3-ylpyrimidin-2-amine

55 **[1683]** MS (ESI, Pos. 20 V) : 358 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0882

4-azepan-1-yl-N-1-[(4-bromothien-2-yl)methyl]azetidin-3-ylpyrimidin-2-amine

5 **[1684]** MS (ESI, Pos. 20 V) : 424, 422 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0883

10 4-azepan-1-yl-N-1-[(5-bromothien-2-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1685] MS (ESI, Pos. 20 V) : 424, 422 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.09.

15 Example 11-0884

4-azepan-1-yl-N-[1-(1H-indol-3-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

20 **[1686]** MS (ESI, Pos. 20 V) : 377 (M + H)⁺, 248, 130;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0885

25 4-azepan-1-yl-N-[1-(pyridin-4-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

[1687] MS (ESI, Pos. 20 V) : 339 (M + H)⁺, 262, 170 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.74.

Example 11-0886

30 4-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)phenol

[1688] MS (ESI, Pos. 20 V) : 354 (M + H)⁺, 248, 193;
HPLC condition : A; HPLC retention time (min) : 2.89.

35 Example 11-0887

4-azepan-1-yl-N-[1-(1,1'-biphenyl-4-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

40 **[1689]** MS (ESI, Pos. 20 V) : 827 (2M + H)⁺, 414 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 11-0888

45 methyl 4-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)benzoate

[1690] MS (ESI, Pos. 20 V) : 791 (2M + H)⁺, 396 (M + H)⁺, 193;
HPLC condition: A; HPLC retention time (min) : 3.03.

50 Example 11-0889

4-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)benzoic acid

55 **[1691]** MS (ESI, Pos. 20 V) : 763 (2M + H)⁺, 382 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.89.

Example 11-0890

4-azepan-1-yl-N-1-[4-(trifluoromethyl)benzyl]azetidin-3-ylpyrimidin-2-amine

5 **[1692]** MS (ESI, Pos. 20 V) : 406 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0891

10 4-azepan-1-yl-N-[1-(4-methylbenzyl)azetidin-3-yl]pyrimidin-2-amine

[1693] MS (ESI, Pos. 20 V) : 352 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.07.

15 Example 11-0892

4-azepan-1-yl-N-(1-neopentylazetidin-3-yl)pyrimidin-2-amine

20 **[1694]** MS (ESI, Pos. 20 V) : 318 (M + H)⁺, 290, 193;
HPLC condition : A; HPLC retention time (min) : 2.92.

Example 11-0893

25 4-azepan-1-yl-N-1-[(2E)-2-methylbut-2-enyl]azetidin-3-ylpyrimidin-2-amine

[1695] MS (ESI, Pos. 20 V) : 316 (M + H)⁺, 282;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0894

30 4-azepan-1-yl-N-(1-isobutylazetidin-3-yl)pyrimidin-2-amine

[1696] MS (ESI, Pos. 20 V) : 304 (M + H)⁺, 290, 248, 193;
HPLC condition : A; HPLC retention time (min) : 2.87.

35 Example 11-0895

4-azepan-1-yl-N-[1-(2-ethylhexyl)azetidin-3-yl]pyrimidin-2-amine

40 **[1697]** MS (ESI, Pos. 20 V) : 719 (2M + H)⁺, 360 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0896

45 4-azepan-1-yl-N-1-[(2E)-3,7-dimethyloct-2,6-dienyl]azetidin-3-ylpyrimidin-2-amine

[1698] MS (ESI, Pos. 20 V) : 384 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.31.

50 Example 11-0897

4-azepan-1-yl-N-(1-(2E)-3-[4-(dimethylamino)phenyl]prop-2-enylazetidin-3-yl)pyrimidin-2-amine

55 **[1699]** MS (ESI, Pos. 20 V) : 407 (M + H)⁺, 276, 204 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.89.

Example 11-0898

4-azepan-1-yl-N-(1-isopentylazetidin-3-yl)pyrimidin-2-amine

5 **[1700]** MS (ESI, Pos. 20 V) : 318 (M + H)⁺, 159.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-0899

10 4-azepan-1-yl-N-(1-propylazetidin-3-yl)pyrimidin-2-amine

[1701] MS (ESI, Pos. 20 V) : 290 (M + H)⁺, 248, 145.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.89.

15 Example 11-0900

4-azepan-1-yl-N-1-[3-(methylsulfanyl)propyl]azetidin-3-ylpyrimidin-2-amine

20 **[1702]** MS (ESI, Pos. 20 V) : 336 (M + H)⁺, 290, 193;
HPLC condition : A; HPLC retention time (min) : 2.90.

Example 11-0901

4-azepan-1-yl-N-(1-butylazetidin-3-yl)pyrimidin-2-amine

25 **[1703]** MS (ESI, Pos. 20 V) : 304 (M + H)⁺, 290, 248, 193;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0902

30 4-azepan-1-yl-N-[1-(quinolin-2-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

[1704] MS (ESI, Pos. 20 V) : 389 (M + H)⁺, 290, 195 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.02.

35 Example 11-0903

4-azepan-1-yl-N-[1-(3-nitrobenzyl)azetidin-3-yl]pyrimidin-2-amine

40 **[1705]** MS (ESI, Pos. 20 V) : 765 (2M + H)⁺, 383 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0904

45 4-(3-[(4-azepan-1-yl)pyrimidin-2-yl]amino)azetidin-1-ylmethyl)-2,6-ditert-butylphenol

[1706] MS (ESI, Pos. 20 V) : 931 (2M + H)⁺, 466 (M + H)⁺, 219;
HPLC condition : A; HPLC retention time (min) : 3.40.

50 Example 11-0905

4-azepan-1-yl-N-[1-(2,3-dihydro-1,4-benzodioxin-6-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

55 **[1707]** MS (ESI, Pos. 20 V) : 791 (2M + H)⁺, 396 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-0906

4-azepan-1-yl-N-[1-(3-furylmethyl)azetidin-3-yl]pyrimidin-2-amine

5 **[1708]** MS (ESI, Pos. 20 V) : 328 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.89.

Example 11-0907

10 4-azepan-1-yl-N-[1-(2,6-dimethoxybenzyl)azetidin-3-yl]pyrimidin-2-amine

[1709] MS (ESI, Pos. 20 V) : 795 (2M + H)⁺, 398 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-0908

4-azepan-1-yl-N-(1-4-[3-(dimethylamino)propoxy]benzylazetidin-3-yl)pyrimidin-2-amine

20 **[1710]** MS (ESI, Pos. 20 V) : 439 (M + H)⁺, 354, 220 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.85.

Example 11-0909

25 4-azepan-1-yl-N-1-[(2-methyl-1H-indol-3-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1711] MS (ESI, Pos. 20 V) : 781 (2M + H)⁺, 391 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0910

30 4-azepan-1-yl-N-[1-(cyclopropylmethyl)azetidin-3-yl]pyrimidin-2-amine

[1712] MS (ESI, Pos. 20 V) : 302 (M + H)⁺, 290, 193;
HPLC condition : A; HPLC retention time (min) : 2.94.

35 Example 11-0911

N-1-[4-(allyloxy)benzyl]azetidin-3-yl-4-azepan-1-ylpyrimidin-2-amine

40 **[1713]** MS (ESI, Pos. 20 V) : 787 (2M + H)⁺, 394 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0912

45 4-azepan-1-yl-N-1-[4-(octyloxy)benzyl]azetidin-3-ylpyrimidin-2-amine

[1714] MS (ESI, Pos. 20 V) : 931 (2M + H)⁺, 466 (M + H)⁺, 248, 144;
HPLC condition : A; HPLC retention time (min) : 3.58.

50 Example 11-0913

4-azepan-1-yl-N-1-[(1-methyl-1H-indol-3-yl)methyl]azetidin-3-ylpyrimidin-2-amine

55 **[1715]** MS (ESI, Pos. 20 V) : 781 (2M + H)⁺, 391 (M + H)⁺, 248, 144;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0914

4-azepan-1-yl-N-[1-(1-benzofuran-2-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

5 [1716] MS (ESI, Pos. 20 V) : 755 (2M + H)⁺, 378 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0915

10 4-azepan-1-yl-N-1-[2-(benzyloxy)benzyl]azetidin-3-ylpyrimidin-2-amine

[1717] MS (ESI, Pos. 20 V) : 444 (M + H)⁺, 354, 248;
HPLC condition: A; HPLC retention time (min) : 3.22.

15 Example 11-0916

4-azepan-1-yl-N-1-[4-(heptyloxy)benzyl]azetidin-3-ylpyrimidin-2-amine

20 [1718] MS (ESI, Pos. 20 V) : 903 (2M + H)⁺, 452 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.51.

Example 11-0917

25 4-azepan-1-yl-N-[1-(1,3-benzodioxol-4-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

[1719] MS (ESI, Pos. 20 V) : 382 (M + H)⁺, 290, 248, 135;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0918

30

4-azepan-1-yl-N-1-[(3,5,6-trimethylcyclohex-3-en-1-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1720] MS (ESI, Pos. 20 V) : 767 (2M + H)⁺, 384 (M + H)⁺, 260, 130;
HPLC condition : A; HPLC retention time (min) : 3.20.

35

Example 11-0919

4-azepan-1-yl-N-1-[4-(hexyloxy)-3-methoxybenzyl]azetidin-3-ylpyrimidin-2-amine

40 [1721] MS (ESI, Pos. 20 V) : 935 (2M + H)⁺, 468 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.38.

Example 11-0920

45 4-azepan-1-yl-N-1-[(6-chloro-1,3-benzodioxol-5-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1722] MS (ESI, Pos. 20 V) : 418, 416 (M + H)⁺, 290, 248, 169;
HPLC condition : A; HPLC retention time (min) : 3.03.

50 Example 11-0921

4-azepan-1-yl-N-1-[(5-ethyl-2-furyl)methyl]azetidin-3-ylpyrimidin-2-amine

55 [1723] MS (ESI, Pos. 20 V) : 356 (M + H)⁺, 290, 248, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0922

4-azepan-1-yl-N-[1-(4-tert-butylbenzyl)azetidin-3-yl]pyrimidin-2-amine

5 [1724] MS (ESI, Pos. 20 V) : 787 (2M + H)⁺, 394 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0923

10 4-azepan-1-yl-N-[1-(3,7-dimethyloct-6-enyl)azetidin-3-yl]pyrimidin-2-amine

[1725] MS (ESI, Pos. 20 V): 771 (2M + H)⁺, 386 (M + H)⁺, 260, 130;
HPLC condition : A; HPLC retention time (min) : 3.31.

15 Example 11-0924

4-azepan-1-yl-N-1-[2-(tert-butylsulfanyl)benzyl]azetidin-3-ylpyrimidin-2-amine

20 [1726] MS (ESI, Pos. 20 V) : 426 (M + H)⁺, 370;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0925

25 4-azepan-1-yl-N-1-[4-(trifluoromethoxy)benzyl]azetidin-3-ylpyrimidin-2-amine

[1727] MS (ESI, Pos. 20 V) : 843 (2M + H)⁺, 422 (M + H)⁺, 175;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0926

30 4-azepan-1-yl-N-1-[(3,5-dimethyl-1-phenyl-1H-pyrazol-4-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1728] MS (ESI, Pos. 20 V) : 432 (M + H)⁺, 216.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

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Example 11-0927

4-azepan-1-yl-N-(1-2-[(4-chlorophenyl)sulfanyl]benzylazetidin-3-yl)pyrimidin-2-amine

40 [1729] MS (ESI, Pos. 20 V) : 482, 480 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.33.

Example 11-0928

45 4-azepan-1-yl-N-1-[(3-methyl-1-benzothien-2-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1730] MS (ESI, Pos. 20 V) : 815 (2M + H)⁺, 408 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.14.

50 Example 11-0929

4-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)-1-naphthol

55 [1731] MS (ESI, Pos. 20 V) : 404 (M + H)⁺, 290, 157;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0930

4-azepan-1-yl-N-(1-4-[2-(diethylamino)ethoxy]benzylazetidin-3-yl)pyrimidin-2-amine

5 **[1732]** MS (ESI, Pos. 20 V) : 453 (M + H)⁺, 227 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.89.

Example 11-0931

10 4-azepan-1-yl-N-(1-[(1R,5S)-6,6-dimethylbicyclo[3.1.1]hept-2-en-2-yl]methylazetidin-3-yl)pyrimidin-2-amine

[1733] MS (ESI, Pos. 20 V) : 763 (2M + H)⁺, 382 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.20.

15 Example 11-0932

4-azepan-1-yl-N-1-[(6-methoxy-2-naphthyl)methyl]azetidin-3-ylpyrimidin-2-amine

20 **[1734]** MS (ESI, Pos. 20 V) : 835 (2M + H)⁺, 418 (M + H)⁺, 171;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0933

25 4-azepan-1-yl-N-[1-(4-[(2E)-4-methylpent-2-enyl]cyclohex-3-en-1-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1735] MS (ESI, Pos. 20 V) : 847 (2M + H)⁺, 424 (M + H)⁺, 356;
HPLC condition : A; HPLC retention time (min) : 3.42.

Example 11-0934

30 4-azepan-1-yl-N-1-[(5-chloro-3-methyl-1-phenyl-1H-pyrazol-4-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1736] MS (ESI, Pos. 20 V) : 903 (2M + H)⁺, 454, 452 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.11.

35 Example 11-0935

4-azepan-1-yl-N-1-[(2-chloroquinolin-3-yl)methyl]azetidin-3-ylpyrimidin-2-amine

40 **[1737]** MS (ESI, Pos. 20 V) : 845 (2M + H)⁺, 425, 423 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0936

45 (3a'R,5'R,6'S,6a'R)-5'-[(3-[4-(1-azepanyl)-2-pyrimidinyl]amino-1-azetidyl)methyl]tetrahydrospiro[cyclohexane-1,2'-furo[2,3-d][1,3]dioxol]-6'-ol

[1738] MS (ESI, Pos. 20 V) : 919 (2M + H)⁺, 460 (M + H)⁺, 181;
HPLC condition : A; HPLC retention time (min) : 3.07.

50 Example 11-0937

4-azepan-1-yl-N-[1-(1,3-thiazol-2-ylmethyl)azetidin-3-yl]pyrimidin-2-amine

55 **[1739]** MS (ESI, Pos. 20 V) : 345 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 2.85.

Example 11-0938

4-azepan-1-yl-N-1-[(5-ethylthien-2-yl)methyl]azetidin-3-ylpyrimidin-2-amine

5 **[1740]** MS (ESI, Pos. 20 V) : 372 (M + H)⁺, 248, 125;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0939

10 2-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)quinolin-8-ol

[1741] MS (ESI, Pos. 20 V) : 809 (2M + H)⁺, 405 (M + H)⁺, 290, 203 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-0940

4-azepan-1-yl-N-1-[(2-phenyl-1H-imidazol-4-yl)methyl]azetidin-3-ylpyrimidin-2-amine

20 **[1742]** MS (ESI, Pos. 20 V) : 404 (M + H)⁺, 290, 248, 157;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 11-0941

25 4-azepan-1-yl-N-[1-(5-[3,5-bis(trifluoromethyl)phenyl]-2-furylmethyl)azetidin-3-yl]pyrimidin-2-amine

[1743] MS (ESI, Pos. 20 V) : 540 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.44.

Example 11-0942

30 methyl 3-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)benzoate

[1744] MS (ESI, Pos. 20 V) : 791 (2M + H)⁺, 396 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 3.02.

35 Example 11-0943

4-azepan-1-yl-N-1-[2-(benzyloxy)ethyl]azetidin-3-ylpyrimidin-2-amine

40 **[1745]** MS (ESI, Pos. 20 V) : 382 (M + H)⁺, 292, 234;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0944

45 4-azepan-1-yl-N-(1-[5-(4-chlorophenyl)-2-furyl]methylazetidin-3-yl)pyrimidin-2-amine

[1746] MS (ESI, Pos. 20 V) : 440, 438 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.25.

50 Example 11-0945

4-azepan-1-yl-N-1-[3-(5-methyl-2-furyl)butyl]azetidin-3-ylpyrimidin-2-amine

55 **[1747]** MS (ESI, Pos. 20 V) : 384 (M + H)⁺, 248, 163;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-0946

4-azepan-1-yl-N-(1-[5-(3-chlorophenyl)-2-furyl]methylazetidin-3-yl)pyrimidin-2-amine

5 **[1748]** MS (ESI, Pos. 20 V) : 875 (2M + H)⁺, 440, 438 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 11-0947

10 methyl 3-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]azetidin-1-ylmethyl)-1H-indole-6-carboxylate

[1749] MS (ESI, Pos. 20 V) : 869 (2M + H)⁺, 435 (M + H)⁺, 290;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-0948

4-azepan-1-yl-N-1-[4-(methylsulfonyl)benzyl]azetidin-3-ylpyrimidin-2-amine

20 **[1750]** MS (ESI, Pos. 20 V) : 831 (2M + H)⁺, 416 (M + H)⁺, 193;
HPLC condition : A; HPLC retention time (min) : 2.90.

Example 11-0949

25 4-azepan-1-yl-N-(1-[5-(2-chlorophenyl)-2-furyl]methylazetidin-3-yl)pyrimidin-2-amine

[1751] MS (ESI, Pos. 20 V) : 440, 438 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 11-0950

30

4-azepan-1-yl-N-1-[(3-phenyl-1H-pyrazol-4-yl)methyl]azetidin-3-ylpyrimidin-2-amine

[1752] MS (ESI, Pos. 20 V) : 807 (2M + H)⁺, 404 (M + H)⁺, 248, 202.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

35

Example 11-0951

4-azepan-1-yl-N-[1-(5-[2-(trifluoromethyl)phenyl]-2-furylmethyl)azetidin-3-yl]pyrimidin-2-amine

40 **[1753]** MS (ESI, Pos. 20 V) : 472 (M + H)⁺, 225;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 11-0952

45 4-azepan-1-yl-N-[1-(5-[3-(trifluoromethyl)phenyl]-2-furylmethyl)azetidin-3-yl]pyrimidin-2-amine

[1754] MS (ESI, Pos. 20 V) : 943 (2M + H)⁺, 472 (M + H)⁺, 225;
HPLC condition : A; HPLC retention time (min) : 3.31.

50 Example 11-0953

4-azepan-1-yl-N-[1-(5-[2-chloro-5-(trifluoromethyl)phenyl]-2-furylmethyl)azetidin-3-yl]pyrimidin-2-amine

55 **[1755]** MS (ESI, Pos. 20 V) : 508, 506 (M + H)⁺, 248;
HPLC condition : A; HPLC retention time (min) : 3.33.

Example 11-0954

4-azepan-1-yl-N-[1-(5-[2-(trifluoromethoxy)phenyl]-2-furylmethyl)azetidin-3-yl]pyrimidin-2-amine

5 **[1756]** MS (ESI, Pos. 20 V) : 975 (2M + H)⁺, 488 (M + H)⁺, 241;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 11-0955

10 4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-methyloxime

[1757] MS (ESI, Pos. 20 V) : 401 (M + H)⁺, 276, 177;
HPLC condition : A; HPLC retention time (min) : 2.98.

15 Example 11-0956

4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-ethyloxime

20 **[1758]** MS (ESI, Pos. 20 V) : 415 (M + H)⁺, 276, 208 (M + 2H)²⁺, 177;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0957

25 4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-allyloxime

[1759] MS (ESI, Pos. 20 V) : 427 (M + H)⁺, 276, 214 (M + 2H)²⁺, 177;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0958

30 4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-(tert-butyl)oxime

[1760] MS (ESI, Pos. 20 V) : 443 (M + H)⁺, 276, 194, 112;
HPLC condition : A; HPLC retention time (min) : 3.20.

35 Example 11-0959

4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-tetrahydro-2H-pyran-2-yloxime

40 **[1761]** MS (ESI, Pos. 20 V) : 471 (M + H)⁺, 387, 276, 194;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0960

45 [(4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexylidene)amino]oxyacetic acid

[1762] MS (ESI, Pos. 20 V) : 445 (M + H)⁺, 416, 304, 185, 171;
HPLC condition : A; HPLC retention time (min) : 2.90.

50 Example 11-0961

4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-isobutyloxime

55 **[1763]** MS (ESI, Pos. 20 V) : 443 (M + H)⁺, 276, 222 (M + 2H)²⁺, 177;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 11-0962

4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-[2-(trimethylsilyl)ethyl]oxime

5 [1764] MS (ESI, Pos. 20 V) : 487 (M + H)⁺, 387, 276, 230;
HPLC condition : A; HPLC retention time (min) : 3.40.

Example 11-0963

10 4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-phenyloxime

[1765] MS (ESI, Pos. 20 V) : 925 (2M + H)⁺, 463 (M + H)⁺, 193, 177;
HPLC condition : A; HPLC retention time (min) : 3.25.

15 Example 11-0964

4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-benzyloxime

20 [1766] MS (ESI, Pos. 20 V) : 477 (M + H)⁺, 387, 239 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0965

25 4-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]piperidin-1-ylcyclohexanone O-trityloxime

[1767] MS (ESI, Pos. 20 V) : 629 (M + H)⁺, 387, 243;
HPLC condition : A; HPLC retention time (min) : 3.60.

Example 11-0966

30 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-phenyl-1,4'-bipiperidin-1'-carboxamide

[1768] MS (ESI, Pos.20V) : 478 (M + H)⁺, 239.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.05.

35 Example 11-0967

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-butyl-1,4'-bipiperidin-1'-carboxamide

40 [1769] MS (ESI, Pos.20V) : 458 (M + H)⁺, 276, 180;
HPLC condition : A; HPLC retention time (min) : 3.00.

Example 11-0968

45 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(4-chlorophenyl)-1,4'-bipiperidin-1'-carboxamide

[1770] MS (ESI, Pos.20V) : 514, 512 (M + H)⁺, 256.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 11-0969

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(3-methylphenyl)-1,4'-bipiperidin-1'-carboxamide

55 [1771] MS (ESI, Pos.20V) : 492 (M + H)⁺, 246.5 (M + 2H)²⁺, 180;
HPLC condition: A; HPLC retention time (min) : 3.11.

Example 11-0970

3-[(4-azepan-1-yl)pyrimidin-2-yl]amino]-N-(3-chlorophenyl)-1,4'-bipiperidin-1'-carboxamide

5 **[1772]** MS (ESI, Pos.20V) : 514, 512 (M + H)⁺, 256.5 (M + 2H)²⁺, 193;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-0971

10 3-[(4-azepan-1-yl)pyrimidin-2-yl]amino]-N-cyclohexyl-1,4'-bipiperidin-1'-carboxamide

[1773] MS (ESI, Pos.20V) : 484 (M + H)⁺, 276, 180;
HPLC condition : A; HPLC retention time (min) : 3.09.

15 Example 11-0972

3-[(4-azepan-1-yl)pyrimidin-2-yl]amino]-N-(2-chlorophenyl)-1,4'-bipiperidin-1'-carboxamide

20 **[1774]** MS (ESI, Pos.20V) : 514, 512 (M + H)⁺, 256.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0973

25 3-[(4-azepan-1-yl)pyrimidin-2-yl]amino]-N-(4-methylphenyl)-1,4'-bipiperidin-1'-carboxamide

[1775] MS (ESI, Pos.20V) : 492 (M + H)⁺, 246.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0974

30 3-[(4-azepan-1-yl)pyrimidin-2-yl]amino]-N-ethyl-1,4'-bipiperidin-1'-carboxamide

[1776] MS (ESI, Pos.20V) : 430 (M + H)⁺, 276, 180;
HPLC condition : A; HPLC retention time (min) : 2.90.

35 Example 11-0975

3-[(4-azepan-1-yl)pyrimidin-2-yl]amino]-N-(3,4-dichlorophenyl)-1,4'-bipiperidin-1'-carboxamide

40 **[1777]** MS (ESI, Pos.20V) : 548, 546 (M + H)⁺, 466, 273.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0976

45 3-[(4-azepan-1-yl)pyrimidin-2-yl]amino]-N-[3-(trifluoromethyl)phenyl]-1,4'-bipiperidin-1'-carboxamide

[1778] MS (ESI, Pos.20V) : 546 (M + H)⁺, 466, 273.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

50 Example 11-0977

3-[(4-azepan-1-yl)pyrimidin-2-yl]amino]-N-(2-methoxyphenyl)-1,4'-bipiperidin-1'-carboxamide

55 **[1779]** MS (ESI, Pos.20V) : 508 (M + H)⁺, 254.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0978

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-hexyl-1,4'-bipiperidin-1'-carboxamide

5 **[1780]** MS (ESI, Pos.20V) : 486 (M + H)⁺, 276, 180;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-0979

10 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(3-methoxyphenyl)-1,4'-bipiperidin-1'-carboxamide

[1781] MS (ESI, Pos.20V) : 508 (M + H)⁺, 254.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-0980

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(4-ethoxyphenyl)-1,4'-bipiperidin-1'-carboxamide

20 **[1782]** MS (ESI, Pos.20V) : 522 (M + H)⁺, 261.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0981

25 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(4-methoxyphenyl)-1,4'-bipiperidin-1'-carboxamide

[1783] MS (ESI, Pos.20V) : 508 (M + H)⁺, 254.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0982

30 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(1-naphthyl)-1,4'-bipiperidin-1'-carboxamide

[1784] MS (ESI, Pos.20V) : 528 (M + H)⁺, 264.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.12.

35 Example 11-0983

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2-ethoxyphenyl)-1,4'-bipiperidin-1'-carboxamide

40 **[1785]** MS (ESI, Pos.20V) : 522 (M + H)⁺, 261.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0984

45 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-[2-(trifluoromethyl)phenyl]-1,4'-bipiperidin-1'-carboxamide

[1786] MS (ESI, Pos.20V) : 546 (M + H)⁺, 253.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

50 Example 11-0985

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,4-dichlorophenyl)-1,4'-bipiperidin-1'-carboxamide

55 **[1787]** MS (ESI, Pos.20V) : 548, 546 (M + H)⁺, 465, 273.5 (M + 2H)²⁺, 193;
HPLC condition: A; HPLC retention time (min) : 3.17.

Example 11-0986

ethyl N-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-ylcarbonyl)glycinate

5 [1788] MS (ESI, Pos.20V) : 488 (M + H)⁺, 221, 193;
HPLC condition : A; HPLC retention time (min) : 2.94.

Example 11-0987

10 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2-methylphenyl)-1,4'-bipiperidin-1'-carboxamide

[1789] MS (ESI, Pos.20V) : 492 (M + H)⁺, 246.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-0988

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2-fluorophenyl)-1,4'-bipiperidin-1'-carboxamide

20 [1790] MS (ESI, Pos.20V) : 496 (M + H)⁺, 248.5 (M + 2H)²⁺, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-0989

25 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(3-fluorophenyl)-1,4'-bipiperidin-1'-carboxamide

[1791] MS (ESI, Pos.20V) : 991 (2M + H)⁺, 496 (M + H)⁺, 248.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-0990

30 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,4-difluorophenyl)-1,4'-bipiperidin-1'-carboxamide

[1792] MS (ESI, Pos.20V) : 514 (M + H)⁺, 257.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

35 Example 11-0991

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(4-isopropylphenyl)-1,4'-bipiperidin-1'-carboxamide

40 [1793] MS (ESI, Pos.20V) : 520 (M + H)⁺, 260.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 11-0992

45 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2-ethylphenyl)-1,4'-bipiperidin-1'-carboxamide

[1794] MS (ESI, Pos.20V) : 506 (M + H)⁺, 253.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.11.

50 Example 11-0993

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-benzyl-1,4'-bipiperidin-1'-carboxamide

55 [1795] MS (ESI, Pos.20V) : 492 (M + H)⁺, 372, 180;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 11-0994

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(4-fluorophenyl)-1,4'-bipiperidin-1'-carboxamide

5 **[1796]** MS (ESI, Pos.20V) : 496 (M + H)⁺, 248.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 11-0995

10 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-[4-(trifluoromethyl)phenyl]-1,4'-bipiperidin-1'-carboxamide

[1797] MS (ESI, Pos.20V) : 546 (M + H)⁺, 466, 273.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

15 Example 11-0996

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,5-dimethylphenyl)-1,4'-bipiperidin-1'-carboxamide

20 **[1798]** MS (ESI, Pos.20V) : 506 (M + H)⁺, 253.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-0997

25 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-[3-(methylsulfonyl)phenyl]-1,4'-bipiperidin-1'-carboxamide

[1799] MS (ESI, Pos.20V) : 524 (M + H)⁺, 262.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-0998

30 N-(1-adamantyl)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-carboxamide

[1800] MS (ESI, Pos.20V) : 536 (M + H)⁺, 461, 180;
HPLC condition : A; HPLC retention time (min) : 3.23.

35 Example 11-0999

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,4-dimethoxyphenyl)-1,4'-bipiperidin-1'-carboxamide

40 **[1801]** MS (ESI, Pos.20V) : 538 (M + H)⁺, 269.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 11-1000

45 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(3,5-dimethylphenyl)-1,4'-bipiperidin-1'-carboxamide

[1802] MS (ESI, Pos.20V) : 506 (M + H)⁺, 446, 253.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.14.

50 Example 11-1001

N-(3-acetylphenyl)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-carboxamide

55 **[1803]** MS (ESI, Pos.20V) : 520 (M + H)⁺, 372, 193;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-1002

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(3,5-dichlorophenyl)-1,4'-bipiperidin-1'-carboxamide

5 [1804] MS (ESI, Pos.20V) : 548, 546 (M + H)⁺, 466, 273.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-1003

10 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,5-dichlorophenyl)-1,4'-bipiperidin-1'-carboxamide

[1805] MS (ESI, Pos.20V) : 548, 546 (M + H)⁺, 466, 273.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.15.

15 Example 11-1004

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-pentyl-1,4'-bipiperidin-1'-carboxamide

20 [1806] MS (ESI, Pos.20V) : 472 (M + H)⁺, 276, 180;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-1005

25 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(1,1'-biphenyl-2-yl)-1,4'-bipiperidin-1'-carboxamide

[1807] MS (ESI, Pos.20V) : 554 (M + H)⁺, 496, 277.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 11-1006

30 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,6-dichlorophenyl)-1,4'-bipiperidin-1'-carboxamide

[1808] MS (ESI, Pos.20V) : 548, 546 (M + H)⁺, 273.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.05.

35 Example 11-1007

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2-phenylethyl)-1,4'-bipiperidin-1'-carboxamide

40 [1809] MS (ESI, Pos.20V) : 506 (M + H)⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-1008

45 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,4-dimethylphenyl)-1,4'-bipiperidin-1'-carboxamide

[1810] MS (ESI, Pos.20V) : 506 (M + H)⁺, 253.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.11.

50 Example 11-1009

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,3-dichlorophenyl)-1,4'-bipiperidin-1'-carboxamide

55 [1811] MS (ESI, Pos.20V) : 548, 546 (M + H)⁺, 273.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-1010

N-(4-acetylphenyl)-3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-carboxamide

5 **[1812]** MS (ESI, Pos.20V) : 520 (M + H)⁺, 372, 193;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 11-1011

10 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(3-cyanophenyl)-1,4'-bipiperidin-1'-carboxamide

[1813] MS (ESI, Pos.20V) : 503 (M + H)⁺, 252 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

15 Example 11-1012

ethyl 4-[(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-ylcarbonyl)amino]benzoate

20 **[1814]** MS (ESI, Pos.20V) : 550 (M + H)⁺, 472, 275.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-1013

25 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-[4-(methylsulfonyl)phenyl]-1,4'-bipiperidin-1'-carboxamide

[1815] MS (ESI, Pos.20V) : 524 (M + H)⁺, 262.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 11-1014

30 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,3-dimethylphenyl)-1,4'-bipiperidin-1'-carboxamide

[1816] MS (ESI, Pos.20V) : 506 (M + H)⁺, 253.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.09.

35 Example 11-1015

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(4-phenoxyphenyl)-1,4'-bipiperidin-1'-carboxamide

40 **[1817]** MS (ESI, Pos.20V) : 570 (M + H)⁺, 478, 285.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 11-1416

45 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(3-ethylphenyl)-1,4'-bipiperidin-1'-carboxamide

[1818] MS (ESI, Pos.20V) : 506 (M + H)⁺, 253.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.18.

50 Example 11-1017

ethyl N-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-ylcarbonyl)methioninate

55 **[1819]** MS (ESI, Pos.20V) : 562 (M + H)⁺, 281.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-1018

ethyl N-(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-ylcarbonyl)phenylalaninate

5 **[1820]** MS (ESI, Pos.20V) : 578 (M + H)⁺, 496, 289.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-1019

10 ethyl 3-[(3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-1,4'-bipiperidin-1'-ylcarbonyl)amino]benzoate

[1821] MS (ESI, Pos.20V) : 550 (M + H)⁺, 275.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

15 Example 11-1020

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2-isopropylphenyl)-1,4'-bipiperidin-1'-carboxamide

20 **[1822]** MS (ESI, Pos.20V) : 520 (M + H)⁺, 260.5 (M + 2H)²⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 11-1021

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-[(1R)-1-phenylethyl]-1,4'-bipiperidin-1'-carboxamide

25 **[1823]** MS (ESI, Pos.20V) : 506 (M + H)⁺, 180;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 11-1022

30 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-[(1R,2S)-2-phenylcyclopropyl]-1,4'-bipiperidin-1'-carboxamide

[1824] MS (ESI, Pos.20V) : 518 (M + H)⁺, 259.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

35 Example 11-1023

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-isopropyl-1,4'-bipiperidin-1'-carboxamide

40 **[1825]** MS (ESI, Pos.20V) : 444 (M + H)⁺, 276, 180;
HPLC condition : A; HPLC retention time (min) : 2.94.

Example 11-1024

45 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-(2,6-difluorophenyl)-1,4'-bipiperidin-1'-carboxamide

[1826] MS (ESI, Pos.20V) : 514 (M + H)⁺, 372, 193;
HPLC condition : A;
HPLC retention time (min) : 3.01.

50 Example 11-1025

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N,N-dimethyl-1,4'-bipiperidin-1'-carboxamide

55 **[1827]** MS (ESI, Pos.20V) : 430 (M + H)⁺, 372, 193;
HPLC condition : A; HPLC retention time (min) : 2.92.

Example 11-1026

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(morpholin-4-ylcarbonyl)-1,4'-bipiperidin-3-amine

5 **[1828]** MS (ESI, Pos.20V) : 472 (M + H)⁺, 372, 114;
HPLC condition : A; HPLC retention time (min) : 2.92.

Example 11-1027

10 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N,N-diethyl-1,4'-bipiperidin-1'-carboxamide

[1829] MS (ESI, Pos.20V) : 458 (M + H)⁺, 372, 193;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 11-1028

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N,N-diisopropyl-1,4'-bipiperidin-1'-carboxamide

20 **[1830]** MS (ESI, Pos.20V) : 486 (M + H)⁺, 359, 128;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 11-1029

3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N-methyl-N-phenyl-1,4'-bipiperidin-1'-carboxamide

25 **[1831]** MS (ESI, Pos.20V) : 492 (M + H)⁺, 359, 134;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 11-1030

30 N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(10H-phenothiazin-10-ylcarbonyl)-1,4'-bipiperidin-3-amine

[1832] MS (ESI, Pos.20V) : 584 (M + H)⁺, 359, 292.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.34.

35 Example 11-1031

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(9H-carbazol-9-ylcarbonyl)-1,4'-bipiperidin-3-amine

40 **[1833]** MS (ESI, Pos.20V) : 552 (M + H)⁺, 468, 276.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 11-1032

45 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N,N-diphenyl-1,4'-bipiperidin-1'-carboxamide

[1834] MS (ESI, Pos.20V) : 554 (M + H)⁺, 470, 359, 196;
HPLC condition : A; HPLC retention time (min) : 3.23.

50 Example 11-1033

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-(pyrrolidin-1-ylcarbonyl)-1,4'-bipiperidin-3-amine

55 **[1835]** MS (ESI, Pos.20V) : 456 (M + H)⁺, 372, 359;
HPLC condition : A; HPLC retention time (min) : 2.98.

Example 11-1034

N-(4-azepan-1-ylpyrimidin-2-yl)-1'-[(4-methylpiperazin-1-yl)carbonyl]-1,4'-bipiperidin-3-amine

5 **[1836]** MS (ESI, Pos.20V) : 485 (M + H)⁺, 227;
HPLC condition : A; HPLC retention time (min) : 2.83.

Example 11-1035

10 3-[(4-azepan-1-ylpyrimidin-2-yl)amino]-N,N-dibutyl-1,4'-bipiperidin-1'-carboxamide

[1837] MS (ESI, Pos.20V) : 514 (M + H)⁺, 450, 359, 156;
HPLC condition : A; HPLC retention time (min) : 3.29.

15 Example 12-1 to Example 12-6

[1838] By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds, the compounds of the present invention were given.

20 Example 12-1

N¹-[2-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-4-yl]-N²,N²-dimethylethane-1,2-diamine

25 **[1839]** NMR (CD₃OD) : δ 2.72 (s, 6H), 2.90 (t, J = 6.00 Hz, 2H), 3.13 (t, J = 6.30 Hz, 2H), 3.74 (t, J = 6.30 Hz, 2H),
3.94 (t, J = 6.00 Hz, 2H), 4.81 (s, 2H), 5.90 (d, J = 6.00 Hz, 1H), 7.17 (m, 4H), 7.75 (d, J = 6.00 Hz, 1H);
MS (ESI, Pos. 20 V) : 298 (M + H)⁺, 224, 186;
HPLC condition : A; HPLC retention time (min) : 2.85;
TLC : R_f 0.53 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

30 Example 12-2

[1840] 1-(4-[2-(dimethylamino)ethyl]aminopyrimidin-2-yl)piperidin-3-ol

Example 12-3

35 N¹-[2-(2,3-dihydro-1H-indol-1-yl)pyrimidin-4-yl]-N²,N²-dimethylethane-1,2-diamine

[1841] MS (ESI, Pos, 20 V) : 284 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.53.

40

Example 12-4

N¹-[2-azepan-1-yl-5-(trifluoromethyl)pyrimidin-4-yl]-N²,N²-dimethylethane-1,2-diamine

45 **[1842]** NMR (DMSO-d₆) : δ 1.47 (m, 4H), 1.76 (m, 4H), 2.15 (s, 6H), 2.37 (t, J = 7.00 Hz, 2H), 3.31 (m, 2H), 3.59 (m,
4H), 7.17 (m, 1H), 8.12 (s, 1H);
MS (ESI, Pos, 20 V) : 332 (M + H)⁺;
TLC : R_f 0.49 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

50 Example 12-5

N¹-[2-azepan-1-yl-5-(4-methylphenyl)pyrimidin-4-yl]-N²,N²-dimethylethane-1,2-diamine

55 **[1843]** NMR (DMSO-d₆) : δ 1.48 (m, 4H), 1.70 (m, 4H), 2.13 (s, 6H), 2.32 (s, 3H), 2.38 (t, J = 6.80 Hz, 2H), 3.38 (dt,
J = 5.4, 6.8 Hz, 2H), 3.69 (t, J = 6.3 Hz, 4H), 6.02 (t, J = 5.40 Hz, 1H), 7.20 (m, 4H), 7.61 (s, 1H);
MS (ESI, Pos, 20 V) : 354 (M + H)⁺, 177.5 (M + 2H)²⁺;
TLC : R_f 0.51 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 12-6

N^1 -[2-azepan-1-yl-5-(4-methoxyphenyl)pyrimidin-4-yl]- N^2,N^2 -dimethylethane-1,2-diamine

[1844] NMR (DMSO- d_6) : δ 1.48 (m, 4H), 1.71 (m, 4H), 2.13 (s, 6H), 2.38 (t, J = 6.80 Hz, 2H), 3.37 (dt, J = 5.3, 6.8 Hz, 2H), 3.68 (t, J = 6.0 Hz, 4H), 3.76 (s, 3H), 5.98 (t, J = 5.30 Hz, 1H), 6.98 (d, J = 8.80 Hz, 2H), 7.23 (d, J = 8.80 Hz, 2H), 7.59 (s, 1H);

MS (ESI, Pos, 20 V): 370 (M + H)⁺, 185.5 (M + 2H)²⁺;

TLC : R_f 0.61 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 13-001 to Example 13-121

[1845] By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds, the compounds of the present invention having the following physical data were given.

Example 13-001

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-[(1S*,2S*)-2-morpholin-4-ylcyclohexyl]quinazolin-2-amine

[1846] NMR (DMSO- d_6) : δ 1.24 (m, 4H), 1.72 (m, 3H), 2.32 (m, 3H), 2.62 (m, 2H), 3.05 (m, 2H), 3.22 (m, 2H), 3.32 (m, 3H), 3.84 (m, 3H), 4.75 (s, 2H), 6.28 (d, J = 6.60 Hz, 1H), 7.06 (m, 1H), 7.19 (m, 4H), 7.31 (d, J = 8.50 Hz, 1H), 7.50 (m, 1H), 7.81 (d, J = 7.40 Hz, 1H);

MS (ESI, Pos. 20 V) : 887 (2M + H)⁺, 444 (M + H)⁺, 222.5 (M + 2H)²⁺;

TLC : R_f 0.34 (AcOEt : MeOH = 10 : 1).

Example 13-002

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-[(1S*,2S*)-2-(4-methylpiperazin-1-yl)cyclohexyl]quinazolin-2-amine

[1847] NMR (DMSO- d_6) : δ 1.19 (m, 4H), 1.71 (m, 3H), 1.97 (s, 3H), 2.17 (m, 4H), 2.37 (m, 3H), 2.61 (m, 2H), 3.06 (t, J = 5.20 Hz, 2H), 3.37 (m, 1H), 3.81 (m, 3H), 4.75 (s, 2H), 6.19 (d, J = 6.60 Hz, 1H), 7.08 (m, 1H), 7.18 (m, 4H), 7.32 (d, J = 8.00 Hz, 1H), 7.50 (m, 1H), 7.80 (d, J = 8.00 Hz, 1H);

MS (ESI, Pos. 20 V) : 913 (2M + H)⁺, 457 (M + H)⁺, 229 (M + 2H)²⁺;

TLC : R_f 0.57 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 13-003

4-azepan-1-yl-N-[(3R)-1-benzylpyrrolidin-3-yl]quinazolin-2-amine

[1848] NMR (CDCl₃) : δ 1.64 (m, 5H), 1.92 (m, 4H), 2.35 (m, 1H), 2.52 (m, 2H), 2.72 (m, 1H), 2.91 (dd, J = 9.40, 6.90 Hz, 1H), 3.63 (s, 2H), 3.86 (t, J = 5.90 Hz, 4H), 4.62 (m, 1H), 5.31 (m, 1H), 6.99 (m, 1H), 7.28 (m, 5H), 7.45 (m, 2H), 7.80 (d, J = 8.20 Hz, 1H);

MS (ESI, Pos. 20 V) : 402 (M + H)⁺, 312;

TLC : R_f 0.55 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 13-004

4-azepan-1-yl-N-[(3S)-1-benzylpyrrolidin-3-yl]quinazolin-2-amine

[1849] NMR (CDCl₃) : δ 1.64 (m, 5H), 1.92 (m, 4H), 2.35 (m, 1H), 2.52 (m, 2H), 2.72 (m, 1H), 2.91 (dd, J = 9.50, 7.00 Hz, 1H), 3.63 (s, 2H), 3.86 (t, J = 5.90 Hz, 4H), 4.62 (m, 1H), 5.35 (m, 1H), 7.00 (m, 1H), 7.28 (m, 5H), 7.45 (m, 2H), 7.80 (d, J = 8.10 Hz, 1H);

MS (ESI, Pos. 20 V) : 402 (M + H)⁺, 312;

TLC : R_f 0.55 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 13-005

4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)pyrrolidin-3-yl]quinazolin-2-amine

- 5 **[1850]** NMR (DMSO- d_6) : δ 1.54 (m, 4H), 1.74 (m, 6H), 2.18 (m, 1H), 2.59 (m, 1H), 2.71 (m, 1H), 2.93 (m, 1H), 3.73 (s, 2H), 3.84 (m, 4H), 4.40 (m, 1H), 6.70 (m, 1H), 6.98 (t, J = 7.70 Hz, 1 H) 7.25 (m, 2H), 7.46 (m, 2H), 7.74 (t, J = 7.50 Hz, 1H), 7.83 (d, J = 8.80 Hz, 1H), 8.47 (d, J = 4.40 Hz, 1H);
MS (ESI, Pos, 20 V): 403 (M + H)⁺, 202 (M + 2H)⁺;
TLC : Rf 0.33 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10

Example 13-006

4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)pyrrolidin-3-yl]quinazolin-2-amine

- 15 **[1851]** NMR (CDCl₃) : δ 0.86 (t, J = 7.00 Hz, 6H), 1.33 (m, 6H), 1.66 (m, 4H), 1.81 (m, 1H), 1.97 (m, 4H), 2.31 (m, 4H), 2.61 (m, 2H), 3.02 (m, 1H), 3.93 (t, J = 5.50 Hz, 4H), 4.53 (m, 1H), 7.06 (m, 1H), 7.52 (m, 2H), 7.80 (d, J = 8.40 Hz, 1H);
MS (ESI, Pos. 20 V) : 396 (M + H)⁺, 312;
TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

20

Example 13-007

4-azepan-1-yl-N-[(3R)-1-isobutylpyrrolidin-3-yl]quinazolin-2-amine

- 25 **[1852]** NMR (CDCl₃) : δ 0.91 (d, J = 6.60 Hz, 6H), 1.66 (m, 6H), 1.94 (m, 4H), 2.22 (dd, J = 7.50, 3.10 Hz, 2H), 2.31 (m, 1H), 2.47 (m, 2H), 2.69 (m, 1H), 2.84 (dd, J = 9.50, 7.00 Hz, 1 H) 3.87 (t, J = 5.90 Hz, 4H), 4.60 (m, 1H), 5.39 (m, 1H), 6.99 (m, 1H), 7.44 (m, 2H), 7.81 (d, J = 8.80 Hz, 1H);
MS (ESI, Pos. 20 V) : 368 (M + H)⁺;
TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

30

Example 13-008

4-azepan-1-yl-N-[(3R)-1-(cyclohexylmethyl)pyrrolidin-3-yl]quinazolin-2-amine

- 35 **[1853]** NMR (CDCl₃) : δ 0.88 (m, 2H), 1.18 (m, 2H), 1.26 (m, 2H), 1.45 (m, 1H), 1.67 (m, 6H), 1.78 (m, 4H), 1.96 (m, 4H), 2.28 (m, 3H), 2.41 (m, 1H), 2.61 (m, 2H), 2.99 (m, 1H), 3.92 (t, J = 5.90 Hz, 4H), 4.56 (m, 1H), 7.05 (m, 1H), 7.49 (m, 2H), 7.80 (d, J = 8.40 Hz, 1H);
MS (ESI, Pos. 20 V) : 408 (M + H)⁺, 204.5 (M + 2H)⁺;
TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

40

Example 13-009

4-azepan-1-yl-N-[(3S)-1-(pyridin-2-ylmethyl)pyrrolidin-3-yl]quinazolin-2-amine

- 45 **[1854]** NMR (CDCl₃) : δ 1.64 (m, 4H), 1.75 (m, 1H), 1.93 (m, 4H), 2.38 (m, 1H), 2.60 (m, 2H), 2.82 (m, 1H), 2.97 (dd, J = 9.90, 7.00 Hz, 1H), 3.76 (d, J = 13.60 Hz, 1H), 3.83 (d, J = 13.60 Hz, 1H), 3.87 (t, J = 5.90 Hz, 4H), 4.65 (m, 1H), 5.59 (m, 1H), 7.00 (m, 1H), 7.15 (dd, J = 5.10, 1.10 Hz, 1H), 7.45 (m, 3H), 7.65 (td, J = 7.60, 1.80 Hz, 1H), 7.80 (d, J = 8.40 Hz, 1H), 8.55 (ddd, J = 5.10, 1.80, 0.70 Hz, 1H);
MS (ESI, Pos. 20 V) : 403 (M + H)⁺, 202 (M + 2H)⁺;
50 TLC : Rf 0.35 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 13-010

4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)pyrrolidin-3-yl]quinazolin-2-amine

- 55 **[1855]** NMR (CDCl₃) : δ 0.86 (t, J = 6.20 Hz, 6H), 1.36 (m, 6H), 1.66 (m, 5H), 1.95 (m, 4H), 2.29 (m, 2H), 2.45 (m, 2H), 2.67 (m, 1H), 2.84 (m, 1H), 3.89 (t, J = 5.50 Hz, 4H), 4.59 (m, 1H), 5.68 (m, 1H), 7.01 (m, 1H), 7.46 (m, 2H), 7.81 (d, J = 8.40 Hz, 1H);

MS (ESI, Pos. 20 V) : 396 (M + H)⁺, 312, 243;
TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 13-011

4-azepan-1-yl-N-[(3S)-1-isobutylpyrrolidin-3-yl]quinazolin-2-amine

[1856] NMR (CDCl₃) : δ 0.92 (d, J = 6.60 Hz, 6H), 1.66 (m, 6H), 1.95 (m, 4H), 2.23 (dd, J = 7.70, 2.90 Hz, 2H), 2.31 (m, 1H), 2.48 (m, 2H), 2.67 (m, 1H), 2.89 (m, 1H), 3.90 (t, J = 5.50 Hz, 4H), 4.59 (m, 1H), 5.93 (m, 1H), 7.03 (m, 1H), 7.47 (m, 2H), 7.81 (d, J = 8.10 Hz, 1H); MS (ESI, Pos. 20 V) : 368 (M + H)⁺, 184.5 (M + 2H)⁺; TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 13-012

4-azepan-1-yl-N-[(3S)-1-(cyclohexylmethyl)pyrrolidin-3-yl]quinazolin-2-amine

[1857] NMR (CDCl₃) : δ 0.89 (m, 2H), 1.20 (m, 4H), 1.45 (m, 1H), 1.67 (m, 6H), 1.78 (m, 3H), 1.96 (m, 4H), 2.29 (dd, J = 7.30, 2.90 Hz, 2H), 2.36 (m, 1H), 2.40 (m, 1H), 2.62 (m, 2H), 2.99 (m, 1H), 3.92 (t, J = 5.90 Hz, 4H), 4.57 (m, 1H), 7.07 (m, 1H), 7.50 (m, 2H), 7.81 (d, J = 8.10 Hz, 1H); MS (ESI, Pos. 20 V) : 408 (M + H)⁺, 312, 243; TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 13-013

4-azepan-1-yl-N-[(3S)-1-cyclohexylpyrrolidin-3-yl]quinazolin-2-amine

[1858] NMR (DMSO-d₆) : δ 1.16 (m, 6H), 1.56 (m, 4H), 1.65 (m, 3H), 1.85 (m, 7H), 2.05 (m, 2H), 2.39 (m, 1H), 2.59 (m, 1H), 2.91 (t, J = 8.40 Hz, 1H), 3.81 (t, J = 5.30 Hz, 4H), 4.33 (m, 1H), 6.62 (m, 1H), 6.97 (t, J = 8.10 Hz, 1H), 7.25 (d, J = 8.10 Hz, 1H), 7.44 (t, J = 8.10 Hz, 1H), 7.82 (d, J = 8.10 Hz, 1H); MS (ESI, Pos. 20 V) : 394 (M + H)⁺, 312, 197.5 (M + 2H)²⁺; TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 13-014

4-azepan-1-yl-N-[(3R)-1-cyclohexylpyrrolidin-3-yl]quinazolin-2-amine

[1859] NMR (DMSO-d₆) : δ 1.16 (m, 6H), 1.56 (m, 4H), 1.66 (m, 3H), 1.86 (m, 7H), 2.05 (m, 2H), 2.39 (m, 1H), 2.59 (m, 1H), 2.90 (t, J = 8.10 Hz, 1H), 3.81 (t, J = 5.50 Hz, 4H), 4.33 (m, 1H), 6.57 (m, 1H), 6.97 (t, J = 8.20 Hz, 1H), 7.25 (d, J = 8.20 Hz, 1H), 7.44 (t, J = 8.20 Hz, 1H), 7.82 (d, J = 8.20 Hz, 1H); MS (ESI, Pos. 20 V) : 394 (M + H)⁺, 312, 197.5 (M + 2H)²⁺; TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 13-015

N¹,N¹-dimethyl-N²-(4-piperidin-1-ylquinazolin-2-yl)ethane-1,2-diamine

[1860] MS (ESI, Pos.20V) : 300 (M + H)⁺, 157;
HPLC condition : A; HPLC retention time (min) : 3.04.

Example 13-016

4-piperidin-1-yl-N-(2-pyrrolidin-1-ylethyl)quinazolin-2-amine

[1861] MS (ESI, Pos.20V) : 326 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 2.94.

Example 13-017

4-piperidin-1-yl-N-(2-piperidin-1-ylethyl)quinazolin-2-amine

5 **[1862]** MS (ESI, Pos.20V) : 340 (M + H)⁺, 170.5 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 2.96.

Example 13-018

10 N-benzyl-4-piperidin-1-ylquinazolin-2-amine

[1863] MS (ESI, Pos.20V) : 637 (2M + H)⁺, 319 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.55.

15 Example 13-019

N-(2-phenylethyl)-4-piperidin-1-ylquinazolin-2-amine

20 **[1864]** MS (ESI, Pos.20V) : 333 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.64.

Example 13-020

N-isopentyl-4-piperidin-1-ylquinazolin-2-amine

25 **[1865]** MS (ESI, Pos.20V) : 597 (2M + H)⁺, 299 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.67.

30 Example 13-021

4-piperidin-1-yl-N-(thien-2-ylmethyl)quinazolin-2-amine

[1866] MS (ESI, Pos.20V) : 325 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.62.

35 Example 13-022

N-(2-furylmethyl)-4-piperidin-1-ylquinazolin-2-amine

40 **[1867]** MS (ESI, Pos.20V) : 309 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

Example 13-023

45 4-piperidin-1-yl-N-(pyridin-2-ylmethyl)quinazolin-2-amine

[1868] MS (ESI, Pos.20V) : 320 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 2.90.

50 Example 13-024

4-piperidin-1-yl-N-(2-pyridin-2-ylethyl)quinazolin-2-amine

55 **[1869]** MS (ESI, Pos.20V) : 334 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 13-025

N-[(5-methylpyrazin-2-yl)methyl]-4-piperidin-1-ylquinazolin-2-amine

5 **[1870]** MS (ESI, Pos.20V): 669 (2M + H)⁺, 335 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 13-026

10 4-azepan-1-yl-N-(2-piperidin-1-ylethyl)quinazolin-2-amine

[1871] MS (ESI, Pos.20V) : 354 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

15 Example 13-027

N¹-(4-azepan-1-ylquinazolin-2-yl)-N³,N³-dimethylpropane-1,3-diamine

20 **[1872]** MS (ESI, Pos.20V) : 328 (M + H)⁺, 157;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 13-028

4-azepan-1-yl-N-benzylquinazolin-2-amine

25 **[1873]** MS (ESI, Pos.20V) : 665 (2M + H)⁺, 333 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.64.

Example 13-029

30 4-azepan-1-yl-N-(2-phenylethyl)quinazolin-2-amine

[1874] MS (ESI, Pos.20V) : 693 (2M + H)⁺, 347 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.71.

35 Example 13-030

4-azepan-1-yl-N-isopentylquinazolin-2-amine

40 **[1875]** MS (ESI, Pos.20V) : 313 (M + H)⁺;
HPLC condition: A; HPLC retention time (min) : 3.73.

Example 13-031

45 4-azepan-1-yl-N-(thien-2-ylmethyl)quinazolin-2-amine

[1876] MS (ESI, Pos.20V) : 339 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.58.

50 Example 13-032

4-azepan-1-yl-N-(2-furylmethyl)quinazolin-2-amine

55 **[1877]** MS (ESI, Pos.20V) : 323 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.49.

Example 13-033

4-azepan-1-yl-N-(pyridin-2-ylmethyl)quinazolin-2-amine

5 **[1878]** MS (ESI, Pos.20V) : 334 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 2.96.

Example 13-034

10 4-azepan-1-yl-N-(2-pyridin-2-ylethyl)quinazolin-2-amine

[1879] MS (ESI, Pos.20V) : 348 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.00.

15 Example 13-035

4-azepan-1-yl-N-[(5-methylpyrazin-2-yl)methyl]quinazolin-2-amine

20 **[1880]** MS (ESI, Pos.20V) : 349 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 13-036

N-benzyl-4-pyrrolidin-1-ylquinazolin-2-amine

25 **[1881]** MS (ESI, Pos.20V) : 609 (2M + H)⁺, 305 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.43.

Example 13-037

30 N-(2-phenylethyl)-4-pyrrolidin-1-ylquinazolin-2-amine

[1882] MS (ESI, Pos.20V) : 319 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.55.

35 Example 13-038

N-isopentyl-4-pyrrolidin-1-ylquinazolin-2-amine

40 **[1883]** MS (ESI, Pos.20V) : 569 (2M + H)⁺, 285 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.58.

Example 13-039

45 4-pyrrolidin-1-yl-N-(thien-2-ylmethyl)quinazolin-2-amine

[1884] MS (ESI, Pos.20V) : 621 (2M + H)⁺, 311 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.42.

50 Example 13-040

N-(2-furylmethyl)-4-pyrrolidin-1-ylquinazolin-2-amine

55 **[1885]** MS (ESI, Pos.20V) : 589 (2M + H)⁺, 295 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.36.

Example 13-041

N-(pyridin-2-ylmethyl)-4-pyrrolidin-1-ylquinazolin-2-amine

5 **[1886]** MS (ESI, Pos.20V) : 306 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 2.83.

Example 13-042

10 N-(2-pyridin-2-ylethyl)-4-pyrrolidin-1-ylquinazolin-2-amine

[1887] MS (ESI, Pos.20V) : 320 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 2.89.

15 Example 13-043

N-[(5-methylpyrazin-2-yl)methyl]-4-pyrrolidin-1-ylquinazolin-2-amine

20 **[1888]** MS (ESI, Pos.20V) : 321 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.04.

Example 13-044

4-azocan-1-yl-N-benzylquinazolin-2-amine

25 **[1889]** MS (ESI, Pos.20V) : 693 (2M + H)⁺, 347 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.71.

Example 13-045

30 4-azocan-1-yl-N-(2-phenylethyl)quinazolin-2-amine

[1890] MS (ESI, Pos.20V) : 721 (2M + H)⁺, 361 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.78.

35 Example 13-046

4-azocan-1-yl-N-isopentylquinazolin-2-amine

40 **[1891]** MS (ESI, Pos.20V) : 653 (2M + H)⁺, 327 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.86.

Example 13-047

45 4-azocan-1-yl-N-(thien-2-ylmethyl)quinazolin-2-amine

[1892] MS (ESI, Pos.20V) : 353 (M + H)⁺, 257
HPLC condition : A; HPLC retention time (min) : 3.69.

50 Example 13-048

4-azocan-1-yl-N-(2-furylmethyl)quinazolin-2-amine

55 **[1893]** MS (ESI, Pos.20V) : 337 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.60.

Example 13-049

4-azocan-1-yl-N-(pyridin-2-ylmethyl)quinazolin-2-amine

5 **[1894]** MS (ESI, Pos.20V) : 348 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.02.

Example 13-050

10 4-azocan-1-yl-N-(2-pyridin-2-ylethyl)quinazolin-2-amine

[1895] MS (ESI, Pos.20V) : 723 (2M + H)⁺, 362 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

15 Example 13-051

4-azocan-1-yl-N-[(5-methylpyrazin-2-yl)methyl]quinazolin-2-amine

20 **[1896]** MS (ESI, Pos.20V) : 725 (2M + H)⁺, 363 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 13-052

25 4-(3-azabicyclo[3.2.2]non-3-yl)-N-benzylquinazolin-2-amine

[1897] MS (ESI, Pos.20V) : 717 (2M + H)⁺, 359 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.75.

Example 13-053

30 4-(3-azabicyclo[3.2.2]non-3-yl)-N-(2-phenylethyl)quinazolin-2-amine

[1898] MS (ESI, Pos.20V) : 745 (2M + H)⁺, 373 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.84.

35 Example 13-054

4-(3-azabicyclo[3.2.2]non-3-yl)-N-isopentylquinazolin-2-amine

40 **[1899]** MS (ESI, Pos.20V) : 339 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.88.

Example 13-055

45 4-(3-azabicyclo[3.2.2]non-3-yl)-N-(pyridin-2-ylmethyl)quinazolin-2-amine

[1900] MS (ESI, Pos.20V) : 360 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

50 Example 13-056

4-(3-azabicyclo[3.2.2]non-3-yl)-N-(2-pyridin-2-ylethyl)quinazolin-2-amine

55 **[1901]** MS (ESI, Pos.20V) : 374 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

Example 13-057

4-(3-azabicyclo[3.2.2]non-3-yl)-N-[(5-methylpyrazin-2-yl)methyl]quinazolin-2-amine

5 **[1902]** MS (ESI, Pos.20V) : 749 (2M + H)⁺, 375 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.31.

Example 13-058

10 2,2'-[(2-[4-(3,4-dihydro-2(1H)-isoquinolinyl)-2-quinazolinyl]aminoethyl)imino]diethanol

[1903] MS (ESI, Pos.20V) : 815 (2M + H)⁺, 408 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 2.98.

15 Example 13-059

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-[3-(1H-imidazol-1-yl)propyl]quinazolin-2-amine

20 **[1904]** MS (ESI, Pos.20V) : 769 (2M + H)⁺, 385 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.06.

Example 13-060

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(2-morpholin-4-ylethyl)quinazolin-2-amine

25 **[1905]** MS (ESI, Pos.20V) : 779 (2M + H)⁺, 390 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.02.

Example 13-061

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(3-pyrrolidin-1-ylpropyl)quinazolin-2-amine

30 **[1906]** MS (ESI, Pos.20V) : 388 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

35 Example 13-062

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-[2-(1-methylpyrrolidin-2-yl)ethyl]quinazolin-2-amine

40 **[1907]** MS (ESI, Pos.20V) : 388 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 13-063

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-[(1-ethylpyrrolidin-2-yl)methyl]quinazolin-2-amine

[1908] MS (ESI, Pos.20V) : 775 (2M + H)⁺, 388 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.09.

50 Example 13-064

N¹-[4-(3,4-dihydroisoquinolin-2(1H)-yl)quinazolin-2-yl]-N³,N³,2,2-tetramethylpropane-1,3-diamine

55 **[1909]** MS (ESI, Pos.20V) : 779 (2M + H)⁺, 390 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 13-065

N^1 -[4-(3,4-dihydroisoquinolin-2(1H)-yl)quinazolin-2-yl]- N^2,N^2 -dimethylpropane-1,2-diamine

5 **[1910]** MS (ESI, Pos.20V) : 362 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 13-066

10 N^1 -[4-(3,4-dihydroisoquinolin-2(1H)-yl)quinazolin-2-yl]- N^2,N^2 -diethylethane-1,2-diamine

[1911] MS (ESI, Pos.20V) : 376 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

15 Example 13-067

N^1 -[4-(3,4-dihydroisoquinolin-2(1H)-yl)quinazolin-2-yl]- N^3,N^3 -diethylpropane-1,3-diamine

20 **[1912]** MS (ESI, Pos.20V) : 390 (M + H)⁺, 195.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 13-068

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(3-morpholin-4-ylpropyl)quinazolin-2-amine

25 **[1913]** MS (ESI, Pos.20V) : 404 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 13-069

30 2,2'-[(3-[4-(3,4-dihydro-2(1H)-isoquinolinyl)-2-quinazolinyl]aminopropyl)imino]diethanol

[1914] MS (ESI, Pos.20V) : 422 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

35 Example 13-070

N^1 -[4-(3,4-dihydroisoquinolin-2(1H)-yl)quinazolin-2-yl]- N^3,N^3 -dimethylpropane-1,3-diamine

40 **[1915]** MS (ESI, Pos.20V) : 362 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 13-071

45 N^2 -[4-(3,4-dihydroisoquinolin-2(1H)-yl)quinazolin-2-yl]- N^1,N^1 -dimethylpropane-1,2-diamine

[1916] MS (ESI, Pos.20V) : 362 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

50 Example 13-072

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-[3-(2-methylpiperidin-1-yl)propyl]quinazolin-2-amine

55 **[1917]** MS (ESI, Pos.20V) : 416 (M + H)⁺, 208.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 13-073

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-[(1-methylpyrrolidin-2-yl)methyl]quinazolin-2-amine

5 **[1918]** MS (ESI, Pos.20V) : 374 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 13-074

10 N-benzyl-4-(3,4-dihydroisoquinolin-2(1H)-yl)quinazolin-2-amine

[1919] MS (ESI, Pos.20V): 733 (2M + H)⁺, 367 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.62.

15 Example 13-075

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(2-phenylethyl)quinazolin-2-amine

20 **[1920]** MS (ESI, Pos.20V): 761 (2M + H)⁺, 381 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.69.

Example 13-076

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-isopentylquinazolin-2-amine

25 **[1921]** MS (ESI, Pos.20V) : 693 (2M + H)⁺, 347 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.75.

Example 13-077

30 **[1922]** 4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(thien-2-ylmethyl)quinazolin-2-amine

Example 13-078

35 **[1923]** 4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(2-furylmethyl)quinazolin-2-amine

Example 13-079

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(pyridin-2-ylmethyl)quinazolin-2-amine

40 **[1924]** MS (ESI, Pos.20V) : 368 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.03.

Example 13-080

45 4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(2-pyridin-2-ylethyl)quinazolin-2-amine

[1925] MS (ESI, Pos.20V) : 382 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

50 Example 13-081

4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-[(5-methylpyrazin-2-yl)methyl]quinazolin-2-amine

55 **[1926]** MS (ESI, Pos.20V) : 765 (2M + H)⁺, 383 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 13-082

4-azepan-1-yl-N-[(3S)-1-benzylazepan-3-yl]quinazolin-2-amine

5 **[1927]** NMR (DMSO- d_6) : δ 1.57 (m, 9H), 1.86 (m, 5H), 2.59 (m, 3H), 2.84 (dd, J = 13.20, 4.00 Hz, 1H), 3.65 (s, 2H), 3.79 (m, 4H), 4.08 (m, 1H), 6.20 (m, 1H), 6.96 (m, 1H), 7.26 (m, 6H), 7.42 (m, 1H), 7.79 (d, J = 8.40 Hz, 1H);
 MS (ESI, Pos. 20 V) : 430 (M + H)⁺, 290, 193;
 HPLC condition : A; HPLC retention time (min) : 3.20;
 TLC : R_f 0.40 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 13-083

4-azepan-1-yl-N-[(3R)-1-benzylazepan-3-yl]quinazolin-2-amine

15 **[1928]** NMR (DMSO- d_6) : δ 1.48 (m, 8H), 1.82 (m, 4H), 2.61 (m, 3H), 2.84 (dd, J = 13.00, 3.80 Hz, 1H), 3.16 (d, J = 5.30 Hz, 2H), 3.65 (s, 2H), 3.78 (m, 4H), 4.06 (m, 1H), 6.19 (m, 1H), 6.95 (t, J = 7.70 Hz, 1H), 7.23 (m, 6H), 7.42 (m, 1H), 7.79 (d, J = 8.20 Hz, 1H);
 MS (ESI, Pos. 20 V) : 430 (M + H)⁺, 340;
 HPLC condition : A; HPLC retention time (min) : 3.18;
 20 TLC : R_f 0.40 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 13-084

N-[(3S)-azepan-3-yl]-4-azepan-1-ylquinazolin-2-amine

25 **[1929]** NMR (DMSO- d_6) : δ 1.51 (m, 10H), 1.84 (m, 5H), 2.63 (dd, J = 13.50, 7.20 Hz, 1H), 2.74 (t, J = 5.80 Hz, 1H), 2.94 (dd, J = 13.50, 4.10 Hz, 1H), 3.80 (m, 4H), 4.04 (m, 1H), 6.21 (m, 1H), 6.95 (t, J = 7.60 Hz, 1H), 7.23 (d, J = 8.20 Hz, 1H), 7.43 (t, J = 7.60 Hz, 1H), 7.80 (d, J = 8.20 Hz, 1H);
 MS (ESI, Pos. 20 V) : 340 (M + H)⁺, 170.5 (M + 2H)²⁺;
 30 HPLC condition : A; HPLC retention time (min) : 3.07;
 TLC : R_f 0.22 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 13-085

N-[(3R)-azepan-3-yl]-4-azepan-1-ylquinazolin-2-amine

35 **[1930]** NMR (DMSO- d_6) : δ 1.57 (m, 10H), 1.84 (m, 5H), 2.63 (dd, J = 13.60, 7.10 Hz, 1H), 2.74 (t, J = 6.00 Hz, 1H), 2.93 (dd, J = 13.60, 4.40 Hz, 1H), 3.80 (m, 4H), 4.04 (m, 1H), 6.23 (m, 1H), 6.95 (t, J = 7.10 Hz, 1H), 7.23 (d, J = 8.10 Hz, 1H), 7.43 (m, 1H), 7.80 (d, J = 8.10 Hz, 1H);
 40 MS (ESI, Pos. 20 V) : 340 (M + H)⁺, 170.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.07;
 TLC : R_f 0.24 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 13-086

4-azepan-1-yl-N-[(3S)-1-(pyridin-2-ylmethyl)azepan-3-yl]quinazolin-2-amine

Example 13-087

50 **[1932]** 4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)azepan-3-yl]quinazolin-2-amine

Example 13-088

4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)azepan-3-yl]quinazolin-2-amine

55 **[1933]** MS (ESI, Pos. 20 V) : 424 (M + H)⁺, 340, 212.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.31.

Example 13-089

4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)azepan-3-yl]quinazolin-2-amine

5 **[1934]** MS (ESI, Pos. 20 V) : 424 (M + H)⁺, 340, 212.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 13-090

10 4-azepan-1-yl-N-[(3S)-1-isobutylazepan-3-yl]quinazolin-2-amine

[1935] MS (ESI, Pos. 20 V) : 396 (M + H)⁺, 340, 198.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

15 Example 13-091

4-azepan-1-yl-N-[(3R)-1-isobutylazepan-3-yl]quinazolin-2-amine

20 **[1936]** MS (ESI, Pos. 20 V) : 396 (M + H)⁺, 340, 198.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 13-092

25 4-azepan-1-yl-N-[(3S)-1-cyclohexylazepan-3-yl]quinazolin-2-amine

[1937] MS (ESI, Pos. 20 V) : 422 (M + H)⁺, 396, 340, 211.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

Example 13-093

30

4-azepan-1-yl-N-[(3R)-1-cyclohexylazepan-3-yl]quinazolin-2-amine

[1938] MS (ESI, Pos. 20 V) : 422 (M + H)⁺, 396, 340, 211.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

35

Example 13-094

4-azepan-1-yl-N-[(3S)-1-benzylpiperidin-3-yl]quinazolin-2-amine

40 **[1939]** MS (ESI, Pos.20V) : 831 (2M + H)⁺, 416 (M + H)⁺, 326;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 13-095

45 4-azepan-1-yl-N-[(3S)-1-benzylpiperidin-3-yl]quinazolin-2-amine

[1940] MS (ESI, Pos.20V) : 831 (2M + H)⁺, 416 (M + H)⁺, 326;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 13-096

4-azepan-1-yl-N-[(3R)-1-benzylpiperidin-3-yl]quinazolin-2-amine

55 **[1941]** MS (ESI, Pos.20V) : 417 (M + H)⁺, 209 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 13-097

4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)piperidin-3-yl]quinazolin-2-amine

5 **[1942]** MS (ESI, Pos.20V) : 417 (M + H)⁺, 209 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.07.

Example 13-098

10 4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)piperidin-3-yl]quinazolin-2-amine

[1943] MS (ESI, Pos.20V) : 819 (2M + H)⁺, 410 (M + H)⁺, 326, 205.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.25.

15 Example 13-099

4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)piperidin-3-yl]quinazolin-2-amine

20 **[1944]** MS (ESI, Pos.20V) : 819 (2M + H)⁺, 410 (M + H)⁺, 326, 205.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.25.

Example 13-100

4-azepan-1-yl-N-[(3S)-1-isobutylpiperidin-3-yl]quinazolin-2-amine

25 **[1945]** MS (ESI, Pos.20V) : 763 (2M + H)⁺, 382 (M + H)⁺, 191.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 13-101

30 4-azepan-1-yl-N-[(3R)-1-isobutylpiperidin-3-yl]quinazolin-2-amine

[1946] MS (ESI, Pos.20V) : 764 (2M + H)⁺, 382 (M + H)⁺, 191.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

35 Example 13-102

4-azepan-1-yl-N-[(3S)-1-cyclohexylpiperidin-3-yl]quinazolin-2-amine

40 **[1947]** MS (ESI, Pos.20V) : 815 (2M + H)⁺, 408 (M + H)⁺, 326, 204.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

Example 13-103

45 4-azepan-1-yl-N-[(3R)-1-cyclohexylpiperidin-3-yl]quinazolin-2-amine

[1948] MS (ESI, Pos.20V) : 815 (2M + H)⁺, 408 (M + H)⁺, 326, 204.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.18.

50 Example 13-104

4-azepan-1-yl-N-[(3S)-piperidin-3-yl]quinazolin-2-amine

55 **[1949]** NMR (CDCl₃) : δ 1.54 (m, 2H), 1.65 (m, 4H), 1.78 (m, 1H), 1.95 (m, 5H), 2.18 (m, 1H), 2.58 (dd, J = 11.80, 8.20 Hz, 1H), 2.67 (m, 1H), 2.91 (m, 1H), 3.28 (dd, J = 11.80, 3.40 Hz, 1H), 3.87 (t, J = 5.70 Hz, 4H), 4.00 (m, 1H), 5.27 (m, 1H), 7.00 (m, 1H), 7.45 (m, 2H), 7.81 (m, 1H);
MS (ESI, Pos. 20 V) : 326 (M + H)⁺, 163.5 (M + 2H)²⁺;
TLC : R_f 0.17 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 13-105

4-azepan-1-yl-N-[(3R)-piperidin-3-yl]quinazolin-2-amine

- 5 **[1950]** NMR (DMSO- d_6) : δ 1.41 (m, 2H), 1.59 (m, 5H), 1.85 (m, 5H), 2.37 (m, 2H), 2.76 (m, 1H), 3.01 (dd, J = 11.40, 3.50 Hz, 1H), 3.80 (m, 5H), 6.27 (m, 1H), 6.96 (t, J = 7.60 Hz, 1H), 7.24 (d, J = 8.20 Hz, 1H), 7.43 (t, J = 7.60 Hz, 1H), 7.80 (d, J = 8.20 Hz, 1H);
 MS (ESI, Pos. 20 V) : 326 (M + H)⁺, 163.5 (M + 2H)²⁺;
 TLC : R_f 0.17 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10

Example 13-106

4-azepan-1-yl-N-(1-benzylazetidin-3-yl)quinazolin-2-amine

- 15 **[1951]** MS (ESI, Pos.20V) : 388 (M + H)⁺, 298;
 HPLC condition : A; HPLC retention time (min) : 3.18.

Example 13-107

20 4-azepan-1-yl-N-[1-(pyridin-2-ylmethyl)azetidin-3-yl]quinazolin-2-amine

- [1952]** MS (ESI, Pos.20V) : 389 (M + H)⁺, 195 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.07.

25 Example 13-108

4-azepan-1-yl-N-[1-(2-ethylbutyl)azetidin-3-yl]quinazolin-2-amine

- 30 **[1953]** MS (ESI, Pos.20V) : 382 (M + H)⁺, 298, 191.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.22.

Example 13-109

35 4-azepan-1-yl-N-(1-isobutylazetidin-3-yl)quinazolin-2-amine

- [1954]** MS (ESI, Pos.20V) : 354 (M + H)⁺, 298, 177.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.09.

Example 13-110

40

4-azepan-1-yl-N-(1-cyclohexylazetidin-3-yl)quinazolin-2-amine

- [1955]** MS (ESI, Pos.20V) : 380 (M + H)⁺, 298, 190.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 3.14.

45

Example 13-111

4-azepan-1-yl-N-azetidin-3-ylquinazolin-2-amine

- 50 **[1956]** MS (ESI, Pos.20V) : 298 (M + H)⁺, 149.5 (M + 2H)²⁺;
 HPLC condition : A; HPLC retention time (min) : 2.89.

Example 13-112

55 2,4-dipiperidin-1-ylquinazoline

- [1957]** MS (ESI, Pos. 20 V) : 297 (M + H)⁺;
 HPLC condition : A; HPLC retention time (min) : 3.42.

Example 13-113

N¹-(4-azepan-1-yl)quinazolin-2-yl)-N²,N²-dimethylethane-1,2-diamine

5 [1958] MS (ESI, Pos. 20 V) : 314 (M + H)⁺, 157.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.92.

Example 13-114

10 2,4-diazepan-1-ylquinazoline

[1959] MS (ESI, Pos. 20 V) : 325 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.62.

15 Example 13-115

N¹-[4-(3,4-dihydroisoquinolin-2(1H)-yl)quinazolin-2-yl]-N²,N²-dimethylethane-1,2-diamine

20 [1960] MS (ESI, Pos. 20 V) : 348 (M + H)⁺, 174.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.02.

Example 13-116

25 4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(2-pyrrolidin-1-ylethyl)quinazolin-2-amine

[1961] MS (ESI, Pos. 20 V) : 374 (M + H)⁺, 187.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.01.

Example 13-117

30 4-(3,4-dihydroisoquinolin-2(1H)-yl)-N-(2-piperidin-1-ylethyl)quinazolin-2-amine

[1962] MS (ESI, Pos. 20 V) : 388 (M + H)⁺, 194.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.60.

35 Example 13-118

4-azepan-1-yl-N-isopentylquinazolin-2-amine

40 [1963] MS (ESI, Pos. 20 V) : 625 (2M + H)⁺, 313 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.73.

Example 13-119

45 N¹-(4-azepan-1-yl)quinazolin-2-yl)-N¹,N²,N²-trimethylethane-1,2-diamine

[1964] NMR (CDCl₃) : δ 7.83 (d, J = 7.5 Hz, 1H), 7.44 (dd, J = 7.5, 6.6 Hz, 1H), 7.27 (d, J = 8.7 Hz, 1H), 6.97 (dd, J = 8.7, 6.6 Hz, 1H), 3.82 (m, 4H), 3.69 (t, J = 6.9 Hz, 2H), 3.11 (s, 3H), 2.41 (t, J = 6.9 Hz, 2H), 2.17 (s, 6H), 1.87 (m, 4H), 1.55 (m, 4H);
50 MS (ESI, Pos. 20 V) : 328 (M + H)⁺;
HPLC condition ; A; HPLC retention time (min) : 2.98.

Example 13-120

55 N²-(4-azepan-1-yl)quinazolin-2-yl)-N¹,N¹-dimethylglycinamide

[1965] NMR (CDCl₃) : δ 7.85 (d, J = 7.2 Hz, 1H), 7.47 (dd, J = 7.2, 7.2 Hz, 1H), 7.25 (d, J = 8.4 Hz, 1H), 7.00 (dd, J = 8.4, 7.2 Hz, 1H), 4.10 (d, J = 5.4 Hz, 2H), 3.81 (m, 4H), 3.01 (s, 3H), 2.84 (s, 3H), 1.85 (m, 4H), 1.55 (m, 4H);

MS (ESI, Pos. 20 V) : 328 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.12.

Example 13-121

[1966] 4-azepan-1-yl-N-(1-methyl-2-piperidin-1-ylethyl)quinazolin-2-amine

Example 14-01 to Example 14-84

[1967] By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds, the compounds of the present invention having the following physical data were given.

Example 14-01

N¹-(6-azepan-1-ylpyrimidin-4-yl)-N²,N²-dimethylethane-1,2-diamine

[1968] NMR (DMSO-d₆) : δ 7.93 (s, 1H), 6.32 (m, 1H), 5.44 (s, 1H), 3.49 (m, 4H), 3.25 (dt, J = 6.0, 6.3 Hz, 2H), 2.34 (t, J = 6.3 Hz, 2H), 2.15 (s, 6H), 1.65 (m, 4H), 1.44 (m, 4H);
MS (ESI, Pos. 20 V) : 264 (M + H)⁺, 219, 132.5 (M + 2H)²⁺;
TLC : R_f 0.38 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-02

N¹-(4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-yl)-N²,N²-dimethylethane-1,2-diamine

[1969] NMR (DMSO-d₆) : δ 1.47 (m, 4H), 1.67 (m, 4H), 1.85 (m, 2H), 2.18 (s, 6H), 2.39 (t, J = 6.90 Hz, 2H), 2.86 (m, 2H), 3.27 (m, 4H), 3.61 (t, J = 6.00 Hz, 4H), 5.95 (m, 1H);
MS (ESI, Pos. 20 V) : 304 (M + H)⁺, 152.5 (M + 2H)²⁺;
TLC : R_f 0.31 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-03

N¹-(4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-yl)-N²,N²-dimethylethane-1,2-diamine

[1970] NMR (DMSO-d₆) : δ 1.49 (m, 4H), 1.58 (m, 2H), 1.70 (m, 6H), 2.18 (s, 6H), 2.41 (m, 4H), 3.26 (m, 4H), 3.51 (m, 4H), 5.97 (m, 1H);
MS (ESI, Pos. 20 V) : 318 (M + H)⁺, 159.5 (M + 2H)²⁺;
TLC : R_f 0.31 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-04

N¹-(4-azepan-1-yl-6-chloropyrimidin-2-yl)-N²,N²-dimethylethane-1,2-diamine

[1971] NMR (CDCl₃) : δ 1.55 (m, 4H), 1.78 (m, 4H), 2.28 (s, 6H), 2.51 (t, J = 6.30 Hz, 2H), 3.46 (m, 6H), 5.33 (m, 1H), 5.79 (s, 1H);
MS (ESI, Pos. 20 V) : 300, 298 (M + H)⁺;
TLC : R_f 0.45 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-05

N¹-(4-azepan-1-yl-6-methoxyquinazolin-2-yl)-N²,N²-dimethylethane-1,2-diamine

[1972] NMR (CDCl₃) : 1.69 (m, 4H), 1.97 (m, 4H), 2.27 (s, 6H), 2.53 (t, J = 6.50 Hz, 2H), 3.56 (m, 2H), 3.85 (m, 4H), 3.82 (s, 3H), 5.40 (m, 1H), 7.21 (m, 2H), 7.45 (d, J = 9.60 Hz, 1H); MS (ESI, Pos. 20 V) : 344 (M + H)⁺, 172.5 (M + 2H)²⁺;
TLC : R_f 0.43 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-06

N^1 -(4-azepan-1-yl)-6,7,8,9-tetrahydro-5H-cyclohepta[d]pyrimidin-2-yl)- N^2,N^2 -dimethylethane-1,2-diamine

- 5 **[1973]** NMR (CD_3OD) : δ 1.63 (m, 8H), 1.82 (m, 6H), 2.32 (s, 6H), 2.59 (m, 4H), 2.70 (m, 2H), 3.47 (t, $J = 6.80$ Hz, 2H), 3.54 (m, 4H);
MS (ESI, Pos. 20 V) : 332 ($M + H$)⁺, 318, 166.5 ($M + 2H$)²⁺;
TLC : Rf 0.40 ($CHCl_3$: MeOH : $NH_4OH = 80 : 10 : 1$).

10 Example 14-07

N^1 -[4-azepan-1-yl-5-(trifluoromethyl)pyrimidin-2-yl]- N^2,N^2 -dimethylethane-1,2-diamine

- 15 **[1974]** NMR ($DMSO-d_6$) : δ 1.46 (m, 4H), 1.69 (m, 4H), 2.16 (s, 6H), 2.41 (t, $J = 6.50$ Hz, 2H), 3.44 (q, $J = 6.50$ Hz, 2H), 3.69 (m, 4H), 6.61 (m, 1H), 8.04 (s, 1H);
MS (ESI, Pos. 20 V) : 332 ($M + H$)⁺, 166.5 ($M + 2H$)²⁺;
TLC : Rf 0.69 ($CHCl_3$: MeOH : $NH_4OH = 80 : 10 : 1$).

20 Example 14-08

N -(4-piperidin-1-ylthieno[3,2-d]pyrimidin-2-yl)ethane-1,2-diamine

- 25 **[1975]** NMR ($CDCl_3$) : 1.68 (m, 6H), 2.01 (m, 2H), 2.94 (m, 2H), 3.50 (q, $J = 5.70$ Hz, 2H), 3.86 (t, $J = 5.70$ Hz, 4H), 5.05 (m, 1H), 7.10 (d, $J = 5.10$ Hz, 1H), 7.53 (d, $J = 5.10$ Hz, 1H); MS (EI, Pos.) : 277 (M^+), 247, 235, 219, 205, 191, 179, 165, 151, 135;
TLC : Rf 0.15 (CH_2Cl_2 : MeOH : $NH_4OH = 80 : 10 : 1$).

Example 14-09

- 30 N -(4-azepan-1-ylthieno[3,2-d]pyrimidin-2-yl)butane-1,4-diamine

- [1976]** NMR ($CDCl_3$) : δ 1.60 (m, 8H), 1.86 (m, 6H), 2.74 (m, 2H), 3.42 (m, 2H), 3.87 (t, $J = 6.00$ Hz, 4H), 4.81 (m, 1H), 7.07 (d, $J = 5.50$ Hz, 1H), 7.52 (d, $J = 5.50$ Hz, 1H);
MS (EI, Pos.) : 319 (M^+), 303, 289, 276, 261, 248, 233, 219, 205;
35 TLC : Rf 0.13 (CH_2Cl_2 : MeOH : $NH_4OH = 80 : 10 : 1$).

Example 14-10

N^1 -[4-azepan-1-yl-5-(4-methylphenyl)pyrimidin-2-yl]- N^2,N^2 -dimethylethane-1,2-diamine

- 40 **[1977]** NMR ($DMSO-d_6$) : δ 1.34 (m, 4H), 1.54 (m, 4H), 2.18 (s, 6H), 2.30 (s, 3H), 2.41 (t, $J = 6.90$ Hz, 2H), 3.31 (m, 6H), 6.33 (m, 1H), 7.15 (d, $J = 8.4$ Hz, 2H), 7.10 (d, $J = 8.4$ Hz, 2H), 7.52 (s, 1H);
MS (ESI, Pos. 20 V) : 354 ($M + H$)⁺, 177.5 ($M + 2H$)²⁺;
45 TLC : Rf 0.31 ($CHCl_3$: MeOH : $NH_4OH = 80 : 10 : 1$).

Example 14-11

N^1 -[4-azepan-1-yl-5-(4-methoxyphenyl)pyrimidin-2-yl]- N^2,N^2 -dimethylethane-1,2-diamine

- 50 **[1978]** NMR ($DMSO-d_6$) : δ 1.36 (m, 4H), 1.52 (m, 4H), 2.18 (s, 6H), 2.41 (t, $J = 7.10$ Hz, 2H), 3.31 (m, 6H), 3.75 (s, 3H), 6.30 (m, 1H), 6.91 (d, $J = 8.80$ Hz, 2H), 7.14 (d, $J = 8.80$ Hz, 2H), 7.51 (s, 1H);
MS (ESI, Pos. 20 V) : 370 ($M + H$)⁺, 185.5 ($M + 2H$)²⁺;
55 TLC : Rf 0.27 ($CHCl_3$: MeOH : $NH_4OH = 80 : 10 : 1$).

Example 14-12

4-azepan-1-yl-N-[(3S)-1-benzylpyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 5 [1979] NMR (DMSO- d_6) : δ 1.42 (m, 4H), 1.64 (m, 6H), 1.83 (m, 2H), 2.08 (m, 1H), 2.25 (dd, J = 9.20, 5.50 Hz, 2H), 2.42 (m, 2H), 2.76 (m, 1H), 2.85 (t, J = 7.10 Hz, 2H), 3.52 (s, 2H), 3.57 (m, 4H), 4.23 (m, 1H), 6.21 (m, 1H), 7.23 (m, 5H);
MS (ESI, Pos, 20 V) : 392 (M + H)⁺, 302, 233;
TLC : Rf 0.44 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10 Example 14-13

4-azepan-1-yl-N-[(3R)-1-benzylpyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 15 [1980] NMR (CDCl₃) : δ 1.53 (m, 4H), 1.71 (m, 5H), 1.96 (m, 2H), 2.29 (m, 1H), 2.42 (m, 1H), 2.54 (m, 1H), 2.69 (m, 3H), 2.91 (m, 3H), 3.61 (s, 2H), 3.66 (t, J = 6.20 Hz, 4H), 4.44 (m, 1H), 5.27 (m, 1H), 7.32 (m, 5H);
MS (ESI, Pos, 20 V) : 392 (M + H)⁺, 358, 302;
TLC : Rf 0.55 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 14-14

20

4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)pyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 25 [1981] NMR (DMSO- d_6) : δ 1.43 (m, 4H), 1.66 (m, 6H), 1.84 (m, 2H), 2.10 (m, 1H), 2.33 (m, J = 7.32, 7.32 Hz, 1H), 2.57 (m, 2H), 2.84 (m, 4H), 3.58 (t, J = 6.00 Hz, 4H), 3.66 (s, 2H), 4.20 (m, 1H), 6.25 (m, 1H), 7.22 (m, 1H), 7.41 (d, J = 7.90 Hz, 1H), 7.72 (td, J = 7.90, 1.70 Hz, 1H), 8.45 (m, 1H);
MS (ESI, Pos, 20 V) : 393 (M + H)⁺, 197 (M + 2H)²⁺;
TLC : Rf 0.41 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-15

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4-azepan-1-yl-N-[(3S)-1-(pyridin-2-ylmethyl)pyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 35 [1982] NMR (CDCl₃) : δ 1.54 (m, 4H), 1.73 (m, 5H), 2.01 (m, 2H), 2.31 (m, 1H), 2.52 (dd, J = 9.50, 5.50 Hz, 1H), 2.68 (m, 2H), 2.75 (t, J = 8.00 Hz, 2H), 2.93 (t, J = 7.00 Hz, 2H), 3.03 (dd, J = 9.50, 6.80 Hz, 1H), 3.69 (t, J = 6.00 Hz, 4H), 3.76 (d, J = 13.70 Hz, 1H), 3.82 (d, J = 13.70 Hz, 1H), 4.45 (m, 1H), 6.94 (m, 1H), 7.15 (ddd, J = 7.70, 4.90, 0.90 Hz, 1H), 7.43 (d, J = 7.70 Hz, 1H), 7.65 (td, J = 7.70, 1.70 Hz, 1H), 8.54 (ddd, J = 4.90, 1.70, 0.90 Hz, 1H);
MS (ESI, Pos, 20 V) : 393 (M + H)⁺, 197 (M + 2H)²⁺;
TLC : Rf 0.26 (AcOEt : MeOH : TEA = 20 : 2 : 1).

40 Example 14-16

4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)pyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 45 [1983] NMR (DMSO- d_6) : δ 0.81 (m, 6H), 1.28 (m, 4H), 1.47 (m, 4H), 1.63 (m, 6H), 1.85 (m, 2H), 2.05 (m, 1H), 2.22 (m, 2H), 2.48 (m, 5H), 2.75 (m, 1H), 2.86 (m, 2H), 3.61 (t, J = 6.00 Hz, 4H), 4.18 (m, 1H), 6.19 (m, 1H);
MS (ESI, Pos, 20 V) : 386 (M + H)⁺, 233, 193.5 (M + 2H)²⁺;
TLC : Rf 0.57 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-17

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4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)pyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 55 [1984] NMR (CDCl₃) : δ 0.85 (t, J = 7.10 Hz, 6H), 1.35 (m, 5H), 1.56 (m, 4H), 1.76 (m, 5H), 1.99 (m, 2H), 2.31 (m, 4H), 2.61 (m, 2H), 2.72 (t, J = 7.80 Hz, 2H), 2.94 (m, 3H), 3.70 (t, J = 6.00 Hz, 4H), 4.41 (m, 1H), 6.42 (m, 1H);
MS (ESI, Pos, 20 V) : 386 (M + H)⁺, 302, 233, 193.5 (M + 2H)²⁺;
TLC : Rf 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 14-18

4-azepan-1-yl-N-[(3S)-1-isobutylpyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

5 **[1985]** NMR (DMSO- d_6) : δ 0.84 (d, J = 6.60 Hz, 6H), 1.45 (m, 4H), 1.61 (m, 6H), 1.85 (m, 2H), 2.08 (m, 3H), 2.24 (m, 1H), 2.45 (m, 4H), 2.74 (m, 1H), 2.86 (t, J = 7.10 Hz, 2H), 3.61 (t, J = 6.00 Hz, 4H), 4.19 (m, 1H), 6.17 (m, 1H); MS (ESI, Pos, 20 V) : 358 (M + H)⁺, 233, 179.5 (M + 2H)²⁺; TLC : R_f 0.45 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10 Example 14-19

4-azepan-1-yl-N-[(3R)-1-isobutylpyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

15 **[1986]** NMR (CDCl₃) : δ 0.91 (d, J = 6.60 Hz, 6H), 1.55 (m, 4H), 1.75 (m, 6H), 1.97 (m, 2H), 2.25 (m, 3H), 2.41 (m, 1H), 2.52 (m, 1H), 2.62 (m, 1H), 2.69 (t, J = 7.80 Hz, 2H), 2.87 (m, 1H), 2.94 (t, J = 7.20 Hz, 2H), 3.68 (t, J = 6.00 Hz, 4H), 4.44 (m, 1H), 5.26 (m, 1H); MS (ESI, Pos, 20 V) : 358 (M + H)⁺, 179.5 (M + 2H)²⁺; TLC : R_f 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

20 Example 14-20

4-azepan-1-yl-N-[(3S)-1-benzylpyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

25 **[1987]** NMR (DMSO- d_6) : δ 1.41 (m, 4H), 1.65 (m, 8H), 2.10 (m, 1H), 2.24 (dd, J = 9.00, 5.60 Hz, 1H), 2.45 (m, 6H), 2.78 (dd, J = 9.00, 7.10 Hz, 1H), 3.34 (m, 1H), 3.48 (t, J = 6.00 Hz, 4H), 4.03 (s, 2H), 4.23 (m, 1H), 6.19 (m, 1H), 7.23 (m, 5H); MS (ESI, Pos, 20 V) : 406 (M + H)⁺, 316; TLC : R_f 0.43 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

30 Example 14-21

4-azepan-1-yl-N-[(3R)-1-benzylpyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

35 **[1988]** NMR (CDCl₃) : 1.54 (m, 4H), 1.66 (m, 4H), 1.75 (m, 5H), 2.27 (m, 1H), 2.41 (dd, J = 9.50, 4.80 Hz, 1H), 2.48 (m, 3H), 2.60 (m, 3H), 2.90 (dd, J = 9.50, 6.60 Hz, 1H), 3.57 (t, J = 6.20 Hz, 4H), 3.60 (s, 2H), 4.43 (m, 1H), 5.12 (m, 1H), 7.26 (m, 5H); MS (ESI, Pos, 20 V) : 406 (M + H)⁺, 316; TLC : R_f 0.55 (AcOEt : MeOH : TEA = 20 : 2 : 1).

40 Example 14-22

4-azepan-1-yl-N-[(3S)-1-(pyridin-2-ylmethyl)pyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

45 **[1989]** NMR (DMSO- d_6) : δ 1.45 (m, 4H), 1.59 (m, 10H), 2.09 (m, 1H), 2.32 (m, 3H), 2.48 (m, 4H), 2.84 (t, J = 7.80 Hz, 1H), 3.49 (t, J = 5.80 Hz, 4H), 3.66 (s, 2H), 4.20 (m, 1H), 6.23 (m, 1H), 7.23 (m, 1H), 7.41 (d, J = 7.90 Hz, 1H), 7.72 (m, 1H); MS (ESI, Pos, 20 V) : 407 (M + H)⁺, 204 (M + 2H)²⁺; TLC : R_f 0.36 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

50 Example 14-23

4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)pyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

55 **[1990]** NMR (CDCl₃) : δ 1.55 (m, 4H), 1.66 (m, 3H), 1.76 (m, 6H), 2.30 (m, 1H), 2.49 (m, 3H), 2.64 (m, 3H), 2.73 (m, 1H), 2.99 (dd, J = 9.50, 6.80 Hz, 1H), 3.62 (t, J = 5.90 Hz, 4H), 3.75 (d, J = 13.70 Hz, 1H), 3.81 (d, J = 13.70 Hz, 1H), 4.45 (m, 1H), 6.36 (m, 1H), 7.15 (ddd, J = 7.60, 4.80, 1.20 Hz, 1H), 7.43 (d, J = 7.60 Hz, 1H), 7.65 (td, J = 7.60, 1.80 Hz, 1H), 8.54 (ddd, J = 4.80, 1.80, 1.20 Hz, 1H); MS (ESI, Pos, 20 V) : 407 (M + H)⁺, 204 (M + 2H)²⁺;

TLC : Rf 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 14-24

5 4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)pyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[1991] NMR (DMSO- d_6) : δ 0.80 (m, 6H), 1.28 (m, 4H), 1.48 (m, 4H), 1.63 (m, 10H), 2.03 (m, 1H), 2.22 (m, 3H), 2.49 (m, 6H), 2.79 (m, 1H), 3.51 (t, J = 5.90 Hz, 4H), 4.17 (m, 1H), 6.15 (m, 1H);

MS (ESI, Pos, 20 V) : 400 (M + H)⁺, 200.5 (M + 2H)²⁺;

10 TLC : Rf 0.40 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-25

4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)pyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

15

[1992] NMR (CDCl₃) : δ 0.85 (t, J = 6.40 Hz, 6H), 1.35 (m, 5H), 1.57 (m, 4H), 1.67 (m, 4H), 1.78 (m, 5H), 2.27 (m, 3H), 2.35 (dd, J = 9.50, 4.90 Hz, 1H), 2.49 (t, J = 5.90 Hz, 2H), 2.58 (m, 2H), 2.64 (t, J = 6.60 Hz, 2H), 2.88 (dd, J = 9.20, 6.80 Hz, 1H), 3.63 (t, J = 5.90 Hz, 4H), 4.40 (m, 1H), 5.97 (m, 1H);

MS (ESI, Pos, 20 V) : 400 (M + H)⁺, 316, 200.5 (M + 2H)²⁺;

20 TLC : Rf 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 14-26

4-azepan-1-yl-N-[(3S)-1-isobutylpyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

25

[1993] NMR (DMSO- d_6) : δ 0.84 (d, J = 6.60 Hz, 6H), 1.49 (m, 4H), 1.62 (m, 10H), 2.07 (m, 3H), 2.23 (m, 1H), 2.47 (m, 6H), 2.75 (m, 1H), 3.51 (m, 4H), 4.17 (m, 1H), 6.15 (m, 1H);

MS (ESI, Pos, 20 V) : 372 (M + H)⁺, 186.5 (M + 2H)²⁺;

TLC : Rf 0.38 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

30

Example 14-27

4-azepan-1-yl-N-[(3R)-1-isobutylpyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

35

[1994] NMR (CDCl₃) : δ 0.91 (d, J = 6.60 Hz, 6H), 1.57 (m, 4H), 1.68 (m, 5H), 1.77 (m, 6H), 2.21 (m, 2H), 2.27 (m, 1H), 2.35 (dd, J = 9.30, 5.10 Hz, 1H), 2.50 (t, J = 6.00 Hz, 2H), 2.57 (m, 1H), 2.64 (t, J = 6.50 Hz, 2H), 2.91 (dd, J = 9.30, 6.80 Hz, 1H), 3.63 (t, J = 6.10 Hz, 4H), 4.40 (m, 1H), 6.09 (m, 1H);

MS (ESI, Pos, 20 V) : 372 (M + H)⁺, 186.5 (M + 2H)²⁺;

TLC : Rf 0.45 (AcOEt : MeOH : TEA = 20 : 2 : 1).

40

Example 14-28

4-azepan-1-yl-N-[(3S)-1-cyclohexylpyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

45

[1995] NMR (DMSO- d_6) : δ 1.14 (m, 6H), 1.49 (m, 4H), 1.62 (m, 6H), 1.79 (m, 4H), 1.99 (m, 2H), 2.29 (m, 1H), 2.55 (m, 5H), 2.86 (m, 3H), 3.60 (t, J = 6.00 Hz, 4H), 4.15 (m, 1H), 6.14 (m, 1H);

MS (ESI, Pos, 20 V) : 384 (M + H)⁺, 302, 192.5 (M + 2H)²⁺;

TLC : Rf 0.39 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-29

4-azepan-1-yl-N-[(3R)-1-cyclohexylpyrrolidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

55

[1996] NMR (DMSO- d_6) : δ 1.15 (m, 6H), 1.46 (m, 4H), 1.66 (m, 10H), 1.82 (m, 2H), 2.02 (m, 2H), 2.33 (m, 1H), 2.48 (m, 2H), 2.58 (m, 1H), 2.86 (m, 3H), 3.61 (t, J = 6.00 Hz, 4H),

4.17 (m, 1H), 6.12 (m, 1H);

MS (ESI, Pos, 20 V) : 384 (M + H)⁺, 302;

TLC : Rf 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 14-30

4-azepan-1-yl-N-[(3S)-1-cyclohexylpyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

5 **[1997]** NMR (DMSO- d_6) : δ 1.17 (m, 6H), 1.63 (m, 16H), 1.99 (m, 2H), 2.28 (m, 1H), 2.48 (m, 7H), 2.85 (t, J = 8.00 Hz, 1H), 3.51 (t, J = 6.00 Hz, 4H), 4.15 (m, 1H), 6.14 (m, 1H);
 MS (ESI, Pos, 20 V) : 398 (M + H)⁺, 316, 199.5 (M + 2H)²⁺;
 TLC : R_f 0.39 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10 Example 14-31

4-azepan-1-yl-N-[(3R)-1-cyclohexylpyrrolidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

15 **[1998]** NMR (DMSO- d_6) : δ 1.15 (m, 6H), 1.48 (m, 7H), 1.68 (m, 11H), 1.98 (m, 2H), 2.29 (dd, J = 9.10, 5.80 Hz, 1H), 2.45 (m, 5H), 2.85 (t, J = 8.40 Hz, 1H), 3.51 (t, J = 6.00 Hz, 4H), 4.15 (m, 1H), 6.13 (m, 1H);
 MS (ESI, Pos, 20 V) : 398 (M + H)⁺, 316, 199.5 (M + 2H)²⁺;
 TLC : R_f 0.50 (AcOEt : MeOH : TEA = 20 : 2 : 1).

20 Example 14-32

6-azepan-1-yl-N-(1-benzylpyrrolidin-3-yl)-9H-purin-2-amine

25 **[1999]** NMR (DMSO- d_6) : δ 1.44 (m, 4H), 1.73 (m, 6H), 2.11 (m, 1H), 2.30 (dd, J = 9.00, 5.20 Hz, 1H), 2.50 (m, 2H), 2.80 (dd, J = 9.00, 7.00 Hz, 1H), 3.54 (s, 2H), 3.80 (m, 2H), 4.25 (m, 2H), 6.13 (d, J = 6.80 Hz, 1H), 7.23 (m, 5H), 7.61 (s, 1H), 12.1 (m, 1H);
 MS (LC-MS, APCI, Pos, 20 V) : 392 (M + H)⁺;
 TLC : R_f 0.40 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

30 Example 14-33

4-azepan-1-yl-N-(1-cyclohexylpiperidin-3-yl)-5,7-dihydrofuro[3,4-d]pyrimidin-2-amine

35 **[2000]** NMR (DMSO- d_6) : δ 1.08 (m, 6H), 1.45 (m, 6H), 1.72 (m, 10H), 1.99 (m, 1H), 2.27 (m, 2H), 2.66 (m, 1H), 2.97 (m, 1H), 3.50 (m, 4H), 3.78 (m, 1H), 4.56 (s, 2H), 5.04 (s, 2H), 6.22 (m, 1H);
 MS (ESI, Pos, 20 V) : 400 (M + H)⁺, 318, 200.5 (M + 2H)²⁺;
 TLC : R_f 0.59 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-34

40

6-azepan-1-yl-2-[(1-cyclohexylpiperidin-3-yl)amino]pyrimidine-4-carboxylic acid dihydrochloride

45 **[2001]** NMR (CD₃OD) : δ 1.23 (m, 2H), 1.39 (m, 3H), 1.63 (m, 6H), 1.86 (m, 6H), 2.13 (m, 5H), 3.06 (m, 1H), 3.21 (m, 1H), 3.51 (m, 1H), 3.72 (m, 2H), 3.79 (m, 2H), 4.01 (m, 1H), 4.06 (m, 1H), 4.56 (m, 1H), 6.98 (s, 1H);
 MS (FAB, Pos., matrix = Glycerin + m-NBA) : 402 (M + H)⁺, 237;
 TLC : R_f 0.25 (AcOEt : MeOH : TEA = 20 : 2 : 1).

Example 14-35

50 6-azepan-1-yl-2-[(1-benzylpiperidin-3-yl)amino]pyrimidine-4-carboxamide

55 **[2002]** NMR (CDCl₃) : δ 1.52 (m, 6H), 1.74 (m, 6H), 2.20 (m, 1H), 2.36 (m, 1H), 2.47 (m, 1H), 2.84 (m, 1H), 3.46 (d, J = 13.20 Hz, 1H), 3.56 (d, J = 13.20 Hz, 1H), 3.68 (m, 4H), 4.04 (m, 1H), 5.04 (m, 1H), 5.48 (m, 1H), 6.65 (s, 1H), 7.28 (m, 5H), 7.67 (m, 1H);
 MS (ESI, Pos, 20 V) : 409 (M + H)⁺, 319;
 TLC : R_f 0.60 (CHCl₃ : MeOH = 10 : 1).

Example 14-36

6-azepan-1-yl-2-(piperidin-3-ylamino)pyrimidine-4-carboxamide

- 5 **[2003]** NMR (CDCl₃) : δ 1.52 (m, 5H), 1.75 (m, 6H), 1.98 (m, 1H), 2.60 (m, 1H), 2.74 (m, 1H), 2.90 (m, 1H), 2.99 (m, 1H), 3.36 (m, 1H), 3.50 (m, 2H), 3.71 (m, 2H), 4.06 (m, 1H), 4.96 (d, J = 7.50 Hz, 1H), 5.71 (m, 1H), 6.68 (s, 1H), 7.89 (m, 1H);
MS (ESI, Pos. 20 V) : 319 (M + H)⁺, 236, 160 (M + 2H)²⁺;
TLC : Rf 0.20 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10

Example 14-37

6-azepan-1-yl-2-[(1-cyclohexylpiperidin-3-yl)amino]pyrimidine-4-carboxamide

- 15 **[2004]** NMR (CDCl₃) : δ 1.22 (m, 6H), 1.53 (m, 6H), 1.76 (m, 10H), 2.27 (m, 2H), 2.44 (m, 1H), 2.62 (m, 1H), 2.98 (m, 1H), 3.51 (m, 2H), 3.74 (m, 2H), 4.01 (m, 1H), 5.04 (m, 1H), 5.47 (m, 1H), 6.66 (s, 1H), 7.77 (m, 1H);
MS (ESI, Pos. 20 V) : 401 (M + H)⁺, 319, 201 (M + 2H)²⁺;
TLC : Rf 0.28 (CHCl₃ : MeOH = 10 : 1).

20 Example 14-38

4-azepan-1-yl-N-[(3S)-1-benzylazepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 25 **[2005]** NMR (DMSO-d₆) : δ 1.39 (m, 5H), 1.67 (m, 8H), 1.86 (m, 3H), 2.52 (m, 5H), 2.83 (m, 3H), 3.57 (t, J = 5.90 Hz, 4H), 3.62 (s, 2H), 3.96 (m, 1H), 5.83 (m, 1H), 7.27 (m, 5H);
MS (ESI, Pos. 20 V) : 839 (2M + H)⁺, 420 (M + H)⁺;
HPLC condition: A; HPLC retention time (min) : 3.16;
TLC : Rf 0.42 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

30 Example 14-39

4-azepan-1-yl-N-[(3R)-1-benzylazepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 35 **[2006]** NMR (DMSO-d₆) : δ 1.42 (m, 6H), 1.60 (m, 8H), 1.84 (m, 2H), 2.51 (m, 5H), 2.82 (m, 3H), 3.57 (t, J = 6.00 Hz, 4H), 3.62 (s, 2H), 3.97 (m, 1H), 5.86 (m, 1H), 7.25 (m, 5H);
MS (ESI, Pos. 20 V) : 839 (2M + H)⁺, 420 (M + H)⁺;
HPLC condition : A; HPLC retention time (min) : 3.18;
TLC : Rf 0.50 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

40 Example 14-40

N-[(3S)-azepan-3-yl]-4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 45 **[2007]** NMR (DMSO-d₆) : δ 1.44 (m, 5H), 1.54 (m, 4H), 1.70 (m, 5H), 1.84 (m, 2H), 2.49 (m, 2H), 2.58 (dd, J = 13.60, 7.00 Hz, 1H), 2.71 (t, J = 6.00 Hz, 2H), 2.87 (m, 3H), 3.59 (t, J = 6.00 Hz, 4H), 3.85 (m, 1H), 5.83 (m, 1H);
MS (ESI, Pos. 20 V) : 330 (M + H)⁺, 165.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.03;
TLC : Rf 0.38 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

50 Example 14-41

N-[(3R)-azepan-3-yl]-4-azepan-1-yl-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

- 55 **[2008]** NMR (DMSO-d₆) : δ 1.45 (m, 5H), 1.54 (m, 4H), 1.68 (m, 5H), 1.84 (m, 2H), 2.49 (m, 2H), 2.58 (dd, J = 13.60, 7.10 Hz, 1H), 2.71 (t, J = 5.90 Hz, 2H), 2.87 (m, 3H), 3.59 (t, J = 6.00 Hz, 4H), 3.86 (m, 1H), 5.86 (m, 1H);
MS (ESI, Pos. 20 V) : 330 (M + H)⁺, 165.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05;
TLC : Rf 0.38 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-42

[2009] 4-azepan-1-yl-N-[(3S)-1-(pyridin-2-ylmethyl)azepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

5 Example 14-43

[2010] 4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)azepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

Example 14-44

10 4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)azepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2011] MS (ESI, Pos. 20 V) : 414 (M + H)⁺, 330, 207.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.25.

15 Example 14-45

4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)azepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

20 **[2012]** MS (ESI, Pos. 20 V) : 414 (M + H)⁺, 330, 207.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 14-46

25 4-azepan-1-yl-N-[(3S)-1-isobutylazepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2013] MS (ESI, Pos. 20 V) : 386 (M + H)⁺, 330, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

30 Example 14-47

4-azepan-1-yl-N-[(3R)-1-isobutylazepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

35 **[2014]** MS (ESI, Pos. 20 V) : 386 (M + H)⁺, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 14-48

40 4-azepan-1-yl-N-[(3S)-1-cyclohexylazepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2015] MS (ESI, Pos. 20 V) : 412 (M + H)⁺, 386, 330, 206.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 14-49

45 4-azepan-1-yl-N-[(3R)-1-cyclohexylazepan-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2016] MS (ESI, Pos. 20 V) : 412 (M + H)⁺, 386, 330, 206.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.20.

50 Example 14-50

4-azepan-1-yl-N-[(3S)-1-benzylazepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

55 **[2017]** NMR (DMSO-d₆) : δ 1.45 (m, 4H), 1.56 (m, 6H), 1.77 (m, 8H), 2.47 (m, 5H), 2.79 (m, 1H), 3.16 (d, J = 5.10 Hz, 2H), 3.48 (t, J = 6.00 Hz, 4H), 3.62 (s, 2H), 3.91 (m, 1H), 5.85 (m, 1H), 7.25 (m, 5H);
MS (ESI, Pos. 20 V) : 434 (M + H)⁺, 344;
HPLC condition : A; HPLC retention time (min) : 3.23;

TLC : Rf 0.42 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-51

5 4-azepan-1-yl-N-[(3R)-1-benzylazepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2018] NMR (DMSO-d₆) : δ 1.45 (m, 4H), 1.56 (m, 6H), 1.75 (m, 8H), 2.47 (m, 5H), 2.79 (dd, J = 13.10, 3.90 Hz, 1H), 3.16 (d, J = 5.00 Hz, 2H), 3.47 (t, J = 6.00 Hz, 4H), 3.62 (s, 2H), 3.94 (m, 1H), 5.83 (m, 1H), 7.23 (m, 5H);

MS (ESI, Pos. 20 V) : 434 (M + H)⁺;

10 HPLC condition : A; HPLC retention time (min) : 3.23;

TLC : Rf 0.42 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1)

Example 14-52

15 N-[(3R)-azepan-3-yl]-4-azepan-1-yl-5,6,7,8-tetrahydroquinazolin-2-amine

[2019] NMR (DMSO-d₆) : δ 1.46 (m, 6H), 1.56 (m, 5H), 1.69 (m, 7H), 2.39 (m, 4H), 2.56 (m, 1H), 2.71 (t, J = 5.90 Hz, 2H), 2.88 (dd, J = 13.50, 4.30 Hz, 1H), 3.50 (t, J = 6.00 Hz, 4H), 3.83 (m, 1H), 5.84 (m, 1H);

MS (ESI, Pos. 20 V) : 344 (M + H)⁺, 172.5 (M + 2H)²⁺;

20 HPLC condition: A; HPLC retention time (min) : 3.11;

TLC : Rf 0.38 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-53

25 **[2020]** 4-azepan-1-yl-N-[(3S)-1-(pyridin-2-ylmethyl)azepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

Example 14-54

30 **[2021]** 4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)azepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

Example 14-55

4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)azepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

35 **[2022]** MS (ESI, Pos. 20 V) : 428 (M + H)⁺, 344, 214.5 (M + 2H)²⁺;

HPLC condition : A; HPLC retention time (min) : 3.33.

Example 14-56

40 4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)azepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2023] MS (ESI, Pos. 20 V) : 428 (M + H)⁺, 344, 214.5 (M + 2H)²⁺;

HPLC condition : A; HPLC retention time (min) : 3.34.

45 Example 14-57

4-azepan-1-yl-N-[(3S)-1-isobutylazepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2024] MS (ESI, Pos. 20 V) : 400 (M + H)⁺, 200.5 (M + 2H)²⁺;

50 HPLC condition : A; HPLC retention time (min) : 3.23.

Example 14-58

4-azepan-1-yl-N-[(3R)-1-isobutylazepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

55

[2025] MS (ESI, Pos. 20 V) : 400 (M + H)⁺, 200.5 (M + 2H)²⁺;

HPLC condition : A; HPLC retention time (min) : 3.22.

Example 14-59

4-azepan-1-yl-N-[(3S)-1-cyclohexylazepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

5 [2026] MS (ESI, Pos. 20 V) : 426 (M + H)⁺, 400, 344, 213.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

Example 14-60

10 4-azepan-1-yl-N-[(3R)-1-cyclohexylazepan-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2027] MS (ESI, Pos.20V) : 426 (M + H)⁺, 400, 344, 213.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.27.

15 Example 14-61

4-azepan-1-yl-N-[(3S)-1-benzylpiperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

20 [2028] MS (ESI, Pos.20V) : 811 (2M + H)⁺, 406 (M + H)⁺, 316;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 14-62

25 4-azepan-1-yl-N-[(3R)-1-benzylpiperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2029] MS (ESI, Pos.20V) : 811 (2M + H)⁺, 406 (M + H)⁺, 316;
HPLC condition : A; HPLC retention time (min) : 3.14.

Example 14-63

30 4-azepan-1-yl-N-[(3S)-1-(pyridin-2-ylmethyl)piperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2030] MS (ESI, Pos.20V) : 407 (M + H)⁺, 204 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

35 Example 14-64

4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)piperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

40 [2031] MS (ESI, Pos.20V) : 407 (M + H)⁺, 204 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.05.

Example 14-65

45 4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)piperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2032] MS (ESI, Pos.20V) : 799 (2M + H)⁺, 400 (M + H)⁺, 200.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.23.

50 Example 14-66

4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)piperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

55 [2033] MS (ESI, Pas.20V) : 799 (2M + H)⁺, 400 (M + H)⁺, 200.5 (M + 2H)²⁺;
HPLC condition: A; HPLC retention time (min) : 3.23.

Example 14-67

4-azepan-1-yl-N-[(3S)-1-isobutylpiperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

5 **[2034]** MS (ESI, Pos.20V) : 743 (2M + H)⁺, 372 (M + H)⁺, 316, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 14-68

10 4-azepan-1-yl-N-[(3R)-1-isobutylpiperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2035] MS (ESI, Pos.20V) : 743 (2M + H)⁺, 372 (M + H)⁺, 344, 186.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

15 Example 14-69

4-azepan-1-yl-N-[(3S)-1-cyclohexylpiperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

20 **[2036]** MS (ESI, Pos.20V) : 398 (M + H)⁺, 372, 316, 199.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 14-70

25 4-azepan-1-yl-N-[(3R)-1-cyclohexylpiperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2037] MS (ESI, Pos.20V) : 795 (2M + H)⁺, 398 (M + H)⁺, 199.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 14-71

30

4-azepan-1-yl-N-[(3S)-piperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2038] NMR (CDCl₃) : δ 1.48 (m, 2H), 1.54 (m, 4H), 1.74 (m, 4H), 1.98 (m, 4H), 2.52 (dd, J = 11.70, 8.20 Hz, 1H),
2.62 (m, 1H), 2.67 (t, J = 7.10 Hz, 2H), 2.87 (m, 1H), 2.94 (t, J = 7.10 Hz, 2H), 3.25 (dd, J = 11.70, 3.70 Hz, 1H), 3.67
35 (t, J = 6.00 Hz, 4H), 3.84 (m, 1H), 4.82 (d, J = 7.90 Hz, 1H);
MS (ESI, Pos. 20 V) : 631 (2M + H)⁺, 316 (M + H)⁺, 158.5 (M + 2H)²⁺;
TLC : R_f 0.17 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-72

40

4-azepan-1-yl-N-[(3R)-piperidin-3-yl]-6,7-dihydro-5H-cyclopenta[d]pyrimidin-2-amine

[2039] NMR (DMSO-d₆) : δ 1.33 (m, 2H), 1.45 (m, 4H), 1.56 (m, 1H), 1.66 (m, 4H), 1.83 (m, 3H), 2.31 (dd, J = 11.40,
8.70 Hz, 1H), 2.41 (m, 3H), 2.73 (m, 1H), 2.86 (t, J = 7.10 Hz, 2H), 2.98 (dd, J = 11.40, 3.70 Hz, 1H), 3.59 (t, J = 6.00
45 Hz, 4H), 3.70 (m, 1H), 5.93 (m, 1H); MS (ESI, Pos. 20 V) : 316 (M + H)⁺, 158.5 (M + 2H)²⁺;
TLC : R_f 0.17 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-73

50 4-azepan-1-yl-N-[(3S)-1-benzylpiperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2040] MS (ESI, Pos.20V) : 839 (2M + H)⁺, 420 (M + H)⁺, 330;
HPLC condition : A; HPLC retention time (min) : 3.22.

55

Example 14-74

4-azepan-1-yl-N-[(3R)-1-benzylpiperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

5 [2041] MS (ESI, Pos.20V) : 839 (2M + H)⁺, 420 (M + H)⁺, 330;
HPLC condition : A; HPLC retention time (min) : 3.20.

Example 14-75

10 4-azepan-1-yl-N-[(3S)-1-(pyridin-2-ylmethyl)piperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2042] MS (ESI, Pos.20V) : 421 (M + H)⁺, 402, 330, 211 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

15 Example 14-76

4-azepan-1-yl-N-[(3R)-1-(pyridin-2-ylmethyl)piperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

20 [2043] MS (ESI, Pos.20V) : 421 (M + H)⁺, 402, 330, 211 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.11.

Example 14-77

25 4-azepan-1-yl-N-[(3S)-1-(2-ethylbutyl)piperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2044] MS (ESI, Pos.20V) : 827(2M + H)⁺, 414(M + H)⁺, 330, 207.5(M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

Example 14-78

30 4-azepan-1-yl-N-[(3R)-1-(2-ethylbutyl)piperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2045] MS (ESI, Pos.20V): 414 (M + H)⁺, 330, 207.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.29.

35 Example 14-79

4-azepan-1-yl-N-[(3S)-1-isobutylpiperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

40 [2046] MS (ESI, Pos.20V) : 771 (2M + H)⁺, 386 (M + H)⁺, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

Example 14-80

45 4-azepan-1-yl-N-[(3R)-1-isobutylpiperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2047] MS (ESI, Pos.20V): 771 (2M + H)⁺, 386 (M + H)⁺, 193.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.16.

50 Example 14-81

4-azepan-1-yl-N-[(3S)-1-cyclohexylpiperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

55 [2048] MS (ESI, Pos.24V) : 823 (2M + H)⁺, 412 (M + H)⁺, 330, 206.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 14-82

4-azepan-1-yl-N-[(3R)-1-cyclohexylpiperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

- 5 [2049] MS (ESI, Pos.20V) : 823 (2M + H)⁺, 412 (M + H)⁺, 330, 206.5 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 3.22.

Example 14-83

- 10 4-azepan-1-yl-N-[(3S)-piperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2050] NMR (CDCl₃) : δ 1.47 (m, 2H), 1.56 (m, 4H), 1.67 (m, 2H), 1.76 (m, 6H), 1.99 (m, 2H), 2.49 (t, J = 6.70 Hz, 2H), 2.53 (m, 1H), 2.61 (t, J = 6.70 Hz, 2H), 2.66 (m, 1H), 2.89 (m, 1H), 3.24 (dd, J = 11.50, 3.50 Hz, 1H), 3.59 (t, J = 6.00 Hz, 4H), 3.81 (m, 1H), 4.88 (m, 1H);

- 15 MS (ESI, Pos. 20 V) : 330 (M + H)⁺, 165.5 (M + 2H)²⁺;
TLC : R_f 0.17 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 14-84

- 20 4-azepan-1-yl-N-[(3R)-piperidin-3-yl]-5,6,7,8-tetrahydroquinazolin-2-amine

[2051] NMR (DMSO-d₆) : δ 1.35 (m, 2H), 1.49 (m, 4H), 1.58 (m, 3H), 1.67 (m, 6H), 1.83 (m, 1H), 2.30 (dd, J = 11.80, 8.80 Hz, 1H), 2.44 (m, 5H), 2.72 (m, 1H), 2.97 (dd, J = 11.80, 3.60 Hz, 1H), 3.50 (t, J = 5.90 Hz, 4H), 3.63 (m, 1H), 5.91 (m, 1H);

- 25 MS (ESI, Pos. 20 V) : 330 (M + H)⁺, 165.5 (M + 2H)²⁺;
TLC : R_f 0.17 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 15-01 to Example 15-55

- 30 [2052] By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds, the compounds of the present invention having the following physical data were given.

Example 15-01

- 35 N²-(2-aminoethyl)-N⁴-benzyl-N⁴-methylpyrimidine-2,4-diamine

[2053] MS (ESI, Pos.20V) : 258 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.89.

- 40 Example 15-02

N²-(2-aminoethyl)-N⁴-methyl-N⁴-(2-phenylethyl)pyrimidine-2,4-diamine

- 45 [2054] MS (ESI, Pos.20V) : 272 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.95.

Example 15-03

N²-(2-aminoethyl)-N⁴,N⁴-diisopentylpyrimidine-2,4-diamine

- 50 [2055] MS (ESI, Pos.20V) : 294 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.24.

Example 15-04

- 55 N²-(2-aminoethyl)-N⁴-[3-(dimethylamino)propyl]-N⁴-methylpyrimidine-2,4-diamine

[2056] MS (ESI, Pos.20V) : 253 (M + H);

HPLC condition : B; HPLC retention time (min) : 2.83.

Example 15-05

5 **[2057]** 1,1'-(2-[(2-aminoethyl)amino]-4-pyrimidinylimino)di(2-propanol)

Example 15-06

N²-(2-aminoethyl)-N⁴,N⁴-dibutylpyrimidine-2,4-diamine

10

[2058] MS (ESI, Pos.20V) : 266 (M + H);

HPLC condition : A; HPLC retention time (min) : 3.10.

Example 15-07

15

[2059] N²-(2-aminoethyl)-N⁴-[2-(dimethylamino)ethyl]-N⁴-methylpyrimidine-2,4-diamine

Example 15-08

20 2-[2-[(2-aminoethyl)amino]pyrimidin-4-yl(butyl)amino]ethanol

[2060] MS (ESI, Pos.20V) : 254 (M + H);

HPLC condition : A;

HPLC retention time (min) : 2.79.

25

Example 15-09

[2061] N²-(2-aminoethyl)-N⁴,N⁴-bis(2-methoxyethyl)pyrimidine-2,4-diamine

30 Example 15-10

N²-(2-aminoethyl)-N⁴-methyl-N⁴-(2-pyridin-2-ylethyl)pyrimidine-2,4-diamine

[2062] MS (ESI, Pos.20V) : 273 (M + H);

35 HPLC condition : B; HPLC retention time (min) : 2.86.

Example 15-11

N²-(2-aminoethyl)-N⁴-methyl-N⁴-(1-methylpiperidin-4-yl)pyrimidine-2,4-diamine

40

[2063] MS (ESI, Pos.20V): 265 (M + H);

HPLC condition : B; HPLC retention time (min) : 2.81.

Example 15-12

45

N²-(2-aminoethyl)-N⁴,N⁴-bis[3-(dimethylamino)propyl]pyrimidine-2,4-diamine

[2064] MS (ESI, Pos.20V) : 324 (M + H);

HPLC condition : B; HPLC retention time (min) : 3.02.

50

Example 15-13

N²-(2-aminoethyl)-N⁴-(2-methoxyethyl)-N⁴-methylpyrimidine-2,4-diamine

55

[2065] MS (ESI, Pos.20V) : 226 (M + H);

HPLC condition : B; HPLC retention time (min) : 2.69.

Example 15-14

N²-(2-aminoethyl)-N⁴-methyl-N⁴-(4-pyridin-3-ylbutyl)pyrimidine-2,4-diamine

5 [2066] MS (ESI, Pos.20V) : 301 (M + H);
HPLC condition : B; HPLC retention time (min) : 3.14.

Example 15-15

10 N²-(2-aminoethyl)-N⁴-methyl-N⁴-[(6-methylpyridin-2-yl)methyl]pyrimidine-2,4-diamine

[2067] MS (ESI, Pos.20V) : 273 (M + H);
HPLC condition : B; HPLC retention time (min) : 2.92.

15 Example 15-16

N²-(2-aminoethyl)-N⁴-benzyl-N⁴-[2-(dimethylamino)ethyl]pyrimidine-2,4-diamine

20 [2068] MS (ESI, Pos.20V) : 315 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.63.

Example 15-17

25 [2069] N²-(2-aminoethyl)-N⁴-(2-furylmethyl)-N⁴-methylpyrimidine-2,4-diamine

Example 15-18

[2070] 4-[2-[(2-aminoethyl)amino]pyrimidin-4-yl(ethyl)amino]butan-1-ol

30 Example 15-19

N²-(2-aminoethyl)-N⁴,N⁴-bis(2-ethoxyethyl)pyrimidine-2,4-diamine

35 [2071] MS (ESI, Pos.20V) : 298 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.86.

Example 15-20

40 N²-(2-aminoethyl)-N⁴-cyclohexylpyrimidine-2,4-diamine

[2072] MS (ESI, Pos.20V) : 236 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.88.

Example 15-21

45 [2073] N²-(2-aminoethyl)-N⁴-[(5-methyl-2-furyl)methyl]pyrimidine-2,4-diamine

Example 15-22

50 N²-(2-aminoethyl)-N⁴-(2,3-dihydro-1H-inden-1-yl)pyrimidine-2,4-diamine

[2074] MS (ESI, Pos.20V) : 270 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.93.

55 Example 15-23

[2075] N²-(2-aminoethyl)-N⁴-(pyridin-3-ylmethyl)pyrimidine-2,4-diamine

Example 15-24

N²-(2-aminoethyl)-N⁴-(2-piperidin-1-ylethyl)pyrimidine-2,4-diamine

5 **[2076]** MS (ESI, Pos.20V) : 265 (M + H);
HPLC condition : B; HPLC retention time (min) : 2.90.

Example 15-25

10 N²-(2-aminoethyl)-N⁴-benzylpyrimidine-2,4-diamine

[2077] MS (ESI, Pos.20V) : 244 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.79.

15 Example 15-26

N²-(2-aminoethyl)-N⁴-cyclooctylpyrimidine-2,4-diamine

20 **[2078]** MS (ESI, Pos.20V) : 264 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.02.

Example 15-27

N²-(2-aminoethyl)-N⁴-hexylpyrimidine-2,4-diamine

25 **[2079]** MS (ESI, Pos.20V) : 238 (M + H);
HPLC condition : A; HPLC retention time (min) : 2.99.

Example 15-28

30 N²-(2-aminoethyl)-N⁴-methyl-N⁴-phenylpyrimidine-2,4-diamine dihydrochloride

[2080] NMR (CD₃OD) : δ 7.66-7.44 (m, 4H), 7.41-7.32 (m, 2H), 5.82 (d, J = 7.5 Hz, 1H), 3.87 (t, J = 6.0 Hz, 2H), 3.60 (s, 3H), 3.30 (t, J = 6.0 Hz, 2H);
35 MS (FAB, Pos., Glycerin + m-NBA): 244 (M + H)⁺, 227, 201;
TLC : R_f 0.20 (n-BuOH : AcOH : H₂O = 4 : 2 : 1).

Example 15-29

40 N²-(2-aminoethyl)-N⁴-benzyl-N⁴-phenylpyrimidine-2,4-diamine dihydrochloride

[2081] NMR (CD₃OD) : δ 7.67 (d, J = 7.2 Hz, 1H), 7.54-7.39 (m, 3H), 7.37-7.17 (m, 7H), 5.84 (d, J = 7.2 Hz, 1H), 5.34 (s, 2H), 3.77 (t, J = 6.0 Hz, 2H), 3.10 (t, J = 6.0 Hz, 2H);
MS (FAB, Pos., Glycerin + m-NBA) : 320 (M + H)⁺, 303, 230;
45 TLC : R_f 0.26 (n-BuOH : AcOH : H₂O = 4 : 2 : 1).

Example 15-30

N²-(2-aminoethyl)-N⁴-(2-piperidin-1-ylethyl)pyrimidine-2,4-diamine dihydrochloride

50 **[2082]** NMR (DMSO-d₆): δ 1.39 (m, 1H), 1.79 (m, 5H), 2.95 (m, 4H), 3.24 (m, 2H), 3.48 (m, 2H), 3.71 (m, 2H), 3.94 (m, 2H), 6.17 (d, J = 7.30 Hz, 1H), 7.74 (d, J = 7.30 Hz, 1H), 8.43 (m, 4H), 9.51 (m, 1H), 10.75 (m, 1H) 12.70 (m, 1H);
MS(LC-MS, APCI, Pos. 20 V) : 265 (M + H)⁺;
55 TLC : R_f 0.38 (CHCl₃ : MeOH : NH₄OH = 80 : 20 : 4).

Example 15-31

2-[(4-[2-(dimethylamino)ethyl]aminopyrimidin-2-yl)(methyl)amino]ethanol

5 **[2083]** MS (ESI, Pos, 20 V) : 240 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 2.72.

Example 15-32

10 N⁴-[2-(dimethylamino)ethyl]-N²-methyl-N²-(1-naphthylmethyl)pyrimidine-2,4-diamine

[2084] MS (ESI, Pos, 20 V) : 336 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.68.

15 Example 15-33

N⁴-[2-(dimethylamino)ethyl]-N²-hexyl-N²-methylpyrimidine-2,4-diamine

20 **[2085]** MS (ESI, Pos, 20 V) : 280 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.82.

Example 15-34

N²-benzyl-N⁴-[2-(dimethylamino)ethyl]-N²-ethylpyrimidine-2,4-diamine

25 **[2086]** MS (ESI, Pos, 20 V) : 300 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.62.

Example 15-35

30 N²-benzyl-N⁴-[2-(dimethylamino)ethyl]-N²-methylpyrimidine-2,4-diamine

[2087] MS (ESI, Pos, 20 V) : 286 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.45.

35 Example 15-36

N⁴-[2-(dimethylamino)ethyl]-N²,N²-bis(pyridin-2-ylmethyl)pyrimidine-2,4-diamine

40 **[2088]** MS (ESI, Pos, 20 V) : 364 (M + H)⁺, 214
HPLC condition : B; HPLC retention time (min) : 3.05.

Example 15-37

45 N⁴-[2-(dimethylamino)ethyl]-N²-methyl-N²-(1-methylpiperidin-4-yl)pyrimidine-2,4-diamine

[2089] MS (ESI, Pos, 20 V) : 293 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 2.98.

50 Example 15-38

N²,N⁴-bis[2-(dimethylamino)ethyl]-N²-methylpyrimidine-2,4-diamine

55 **[2090]** MS (ESI, Pos, 20 V) : 267 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 2.96.

Example 15-39

N⁴-[2-(dimethylamino)ethyl]-N²-methyl-N²-(2-phenylethyl)pyrimidine-2,4-diamine

5 **[2091]** MS (ESI, Pos, 20 V) : 300 (M + H)⁺;
HPLC condition: B; HPLC retention time (min) : 3.56.

Example 15-40

10 N⁴-[2-(dimethylamino)ethyl]-N²-(2-furylmethyl)-N²-methylpyrimidine-2,4-diamine

[2092] MS (ESI, Pos, 20 V) : 276 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.29.

15 Example 15-41

N⁴-[2-(dimethylamino)ethyl]-N²-[2-(1H-indol-3-yl)ethyl]-N²-methylpyrimidine-2,4-diamine

20 **[2093]** MS (ESI, Pos, 20 V) : 339 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.47.

Example 15-42

25 N²-cyclopentyl-N⁴-[2-(dimethylamino)ethyl]pyrimidine-2,4-diamine

[2094] MS (ESI, Pos, 20 V) : 250 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.22.

Example 15-43

30 N²-cyclohexyl-N⁴-[2-(dimethylamino)ethyl]pyrimidine-2,4-diamine

[2095] MS (ESI, Pos, 20 V) : 527 (2M + H)⁺, 264 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.36.

35 Example 15-44

N⁴-[2-(dimethylamino)ethyl]-N²-(3-methylcyclohexyl)pyrimidine-2,4-diamine

40 **[2096]** MS (ESI, Pos, 20 V) : 555 (2M + H)⁺, 278 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.53.

Example 15-45

45 N⁴-[2-(dimethylamino)ethyl]-N²-(4-methylcyclohexyl)pyrimidine-2,4-diamine

[2097] MS (ESI, Pos, 20 V) : 555 (2M + H)⁺, 278 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.55.

50 Example 15-46

N²-(cyclohexylmethyl)-N⁴-[2-(dimethylamino)ethyl]pyrimidine-2,4-diamine

55 **[2098]** MS (ESI, Pos, 20 V) : 555 (2M + H)⁺, 278 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.53.

Example 15-47

N²-(2,3-dihydro-1H-inden-1-yl)-N⁴-[2-(dimethylamino)ethyl]pyrimidine-2,4-diamine

5 [2099] MS (ESI, Pos, 20 V) : 595 (2M + H)⁺, 298 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.42.

Example 15-48

10 N²-cyclohexyl-N⁴-[2-(dimethylamino)ethyl]-N²-methylpyrimidine-2,4-diamine

[2100] MS (ESI, Pos, 20 V) : 278 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.64.

15 Example 15-49

N²-cycloheptyl-N⁴-[2-(dimethylamino)ethyl]pyrimidine-2,4-diamine

20 [2101] MS (ESI, Pos, 20 V) : 555 (2M + H)⁺, 278 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.55.

Example 15-50

25 N⁴-[2-(dimethylamino)ethyl]-N²-(pyridin-3-ylmethyl)pyrimidine-2,4-diamine

[2102] MS (ESI, Pos, 20 V) : 273 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 2.79.

Example 15-51

30 N⁴-[2-(dimethylamino)ethyl]-N²-(pyridin-4-ylmethyl)pyrimidine-2,4-diamine

[2103] MS (ESI, Pos, 20 V) : 273 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 2.78.

35 Example 15-52

N²-benzyl-N⁴-[2-(dimethylamino)ethyl]pyrimidine-2,4-diamine

40 [2104] MS (ESI, Pos, 20 V) : 543 (2M + H)⁺, 272 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.23.

Example 15-53

45 N⁴-[2-(dimethylamino)ethyl]-N²-(2-phenylethyl)pyrimidine-2,4-diamine

[2105] MS (ESI, Pos, 20 V) : 571 (2M + H)⁺, 286 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.34.

50 Example 15-54

N²-butyl-N⁴-[2-(dimethylamino)ethyl]pyrimidine-2,4-diamine

55 [2106] MS (ESI, Pos, 20 V) : 238 (M + H)⁺;
HPLC condition : B; HPLC retention time (min) : 3.20.

Example 15-55

6-(2-[(1-cyclohexylpiperidin-3-yl)amino]pyrimidin-4-ylamino)hexan-1-ol

5 **[2107]** NMR (DMSO- d_6) : δ 1.17 (m, 6H), 1.29 (m, 5H), 1.48 (m, 6H), 1.72 (m, 5H), 2.00 (m, 1H), 2.27 (m, 2H), 2.63 (m, 1H), 2.91 (m, 1H), 3.16 (m, 2H), 3.41 (m, 2H), 3.76 (m, 1H), 4.36 (m, 1H), 5.65 (d, J = 5.70 Hz, 1H), 6.03 (m, 1H), 6.83 (m, 1H), 7.58 (d, J = 5.70 Hz, 1H); MS (ESI, Pos, 20 V) : 376 (M + H)⁺, 294, 188.5 (M + 2H)²⁺; TLC : R_f 0.38 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10 Example 16-1 to Example 16-3

[2108] By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds, the compounds of the present invention having the following physical data were given.

15 Example 16-1

N,N'-bis[2-(dimethylamino)ethyl]quinazoline-2,4-diamine

[2109] MS (ESI, Pos. 20 V) : 303 (M + H)⁺, 168;
20 HPLC condition : A; HPLC retention time (min) : 0.36.

Example 16-2

N,N'-bis(2-pyrrolidin-1-ylethyl)quinazoline-2,4-diamine

25 **[2110]** MS (ESI, Pos. 20 V) : 355 (M + H)⁺, 178 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.59.

Example 16-3

30 N,N'-bis(2-piperidin-1-ylethyl)quinazoline-2,4-diamine

[2111] MS (ESI, Pos. 20 V) : 383 (M + H)⁺, 192 (M + 2H)²⁺;
HPLC condition : A; HPLC retention time (min) : 2.68.

35 Example 17-01 to Example 17-12

[2112] By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds, the compounds of the present invention having the following physical data were given.

40 Example 17-01

N-(4-azepan-1-ylpyrimidin-2-yl)-N-[2-(dimethylamino)ethyl]-1,1'-biphenyl-4-carboxamide

45 **[2113]** MS (ESI, Pos.20V) : 444 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.45.

Example 17-02

50 N-(4-azepan-1-ylpyrimidin-2-yl)-N-[3-(dimethylamino)propyl]-1,1'-biphenyl-4-carboxamide

[2114] MS (ESI, Pos.20V) : 458 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.29.

55

Example 17-03

N-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]-N-[2-(dimethylamino)ethyl]-1,1'-biphenyl-4-carboxamide

5 **[2115]** MS (ESI, Pos.20V) : 478 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.54.

Example 17-04

10 N-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]-N-[3-(dimethylamino)propyl]-1,1'-biphenyl-4-carboxamide

[2116] MS (ESI, Pos.20V) : 492 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.44.

15 Example 17-05

N-[2-(dimethylamino)ethyl]-4-(pentyloxy)-N-(4-piperidin-1-ylpyrimidin-2-yl)benzamide

20 **[2117]** MS (ESI, Pos.20V) : 440 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.47.

Example 17-06

25 N-[3-(dimethylamino)propyl]-4-(pentyloxy)-N-(4-piperidin-1-ylpyrimidin-2-yl)benzamide

[2118] MS (ESI, Pos.20V) : 454 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.36.

Example 17-07

30

N-(4-azepan-1-ylpyrimidin-2-yl)-N-[2-(dimethylamino)ethyl]-4-(pentyloxy)benzamide

[2119] MS (ESI, Pos.20V) : 454 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.52.

35

Example 17-08

N-(4-azepan-1-ylpyrimidin-2-yl)-N-[3-(dimethylamino)propyl]-4-(pentyloxy)benzamide

40 **[2120]** MS (ESI, Pos.20V) : 468 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.39.

Example 17-09

45 N-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]-N-[2-(dimethylamino)ethyl]-4-(pentyloxy)benzamide

[2121] MS (ESI, Pos.20V) : 488 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.66.

50 Example 17-10

N-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]-N-[3-(dimethylamino)propyl]-4-(pentyloxy)benzamide

55 **[2122]** MS (ESI, Pos.20V) : 502 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.55.

Example 17-11

3-cyclopentyl-N-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]-N-[2-(dimethylamino)ethyl]propanamide

5 [2123] MS (ESI, Pos.20V) : 422 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.46.

Example 17-12

10 3-cyclopentyl-N-[4-(3,4-dihydroisoquinolin-2(1H)-yl)pyrimidin-2-yl]-N-[3-(dimethylamino)propyl]propanamide

[2124] MS (ESI, Pos.20V) : 436 (M + H);
HPLC condition : A; HPLC retention time (min) : 3.26.

15 Example 18-1 to Example 18-3

[2125] By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds, the compounds of the present invention having the following physical data were given.

20 Example 18-1

2-[(4-azepan-1-yl)quinazolin-2-yl]oxy]-N,N-dimethylethanamine

[2126] MS (ESI, Pos. 20 V) : 315 (M + H)⁺;
25 HPLC condition : A; HPLC retention time (min) : 2.83.

Example 18-2

4-azepan-1-yl-N-(1-cyclohexylpiperidin-3-yl)pyrimidine-2-carboxamide

30 [2127] NMR (CDCl₃) : δ 1.22 (m, 4H), 1.58 (m, 8H), 1.82 (m, 10H), 2.30 (m, 1H), 2.43 (m, 1H), 2.68 (m, 3H), 3.52 (m, 2H), 3.89 (m, 2H), 4.24 (m, 1H), 6.45 (d, J = 6.21 Hz, 1H), 8.28 (d, J = 6.21 Hz, 1H), 8.58 (d, J = 7.72 Hz, 1H);
MS (ESI, Pos. 20 V) : 386 (M + H)⁺;
TLC : R_f 0.53 (CHCl₃ : MeOH = 9 : 1).

35 Example 18-3

N-(4-azepan-1-yl-1-oxidopyrimidin-2-yl)ethane-1,2-diamine

40 [2128] NMR (CDCl₃) : δ 1.54 (m, 4H), 1.76 (m, 4H), 1.98 (m, 2H), 2.94 (t, J = 6.00 Hz, 2H), 3.52 (q, J = 6.00 Hz, 2H), 3.57 (m, 4H), 5.76 (d, J = 7.30 Hz, 1H), 7.26 (m, 1H), 7.84 (d, J = 7.30 Hz, 1H);
MS (ESI, Pos. 20 V) : 503 (2M + H)⁺, 252 (M + H)⁺, 126.5 (M + 2H)²⁺;
TLC : R_f 0.13 (CHCl₃ : MeOH : NH₄OH = 40 : 10 : 1).

45 Example 19-01 to Example 19-12

[2129] By the same procedure as described in Reference Example 1 → Example 1 using corresponding compounds, the compounds of the present invention having the following physical data were given.

50 Example 19-01

6-azepan-1-yl-N-(1-cyclohexylpiperidin-3-yl)pyridine-2-carboxamide

55 [2130] NMR (CDCl₃) : δ 1.22 (m, 4H), 1.68 (m, 18H), 2.28 (m, 1H), 2.41 (m, 1H), 2.67 (m, 3H), 3.65 (m, 4H), 4.20 (m, 1H), 6.61 (dd, J = 8.56, 0.67 Hz, 1H), 7.39 (dd, J = 7.22, 0.67 Hz, 1H), 7.53 (dd, J = 8.56, 7.22 Hz, 1H), 8.65 (d, J = 8.06 Hz, 1H);
MS (ESI, Pos. 20 V) : 385 (M + H)⁺, 193 (M + 2H)²⁺;
TLC : R_f 0.62 (CHCl₃ : MeOH = 9 : 1).

Example 19-02

N¹-(6-azepan-1-ylpyridin-2-yl)-N²,N²-dimethylglycinamide

- 5 [2131] NMR (CDCl₃): δ 1.54 (m, 4H), 1.77 (m, 4H), 2.37 (s, 6H), 3.06 (s, 2H), 3.60 (t, J = 6.04 Hz, 4H), 6.23 (dd, J = 7.81, 0.84 Hz, 1H), 7.38 (dd, J = 7.81, 0.84 Hz, 1H), 7.43 (t, J = 7.81 Hz, 1H), 9.09 (s, 1H);
MS (ESI, Pos. 20 V): 277 (M + H)⁺;
TLC : Rf 0.76 (EtOAc : MeOH = 9 : 1).

10 Example 19-03

N¹-(4-azepan-1-ylquinolin-2-yl)-N²,N²-dimethylethane-1,2-diamine

- 15 [2132] NMR (DMSO-d₆) : δ 7.74 (d, J = 7.5 Hz, 1H), 7.43-7.33 (m, 2H), 7.05 (m, 1H), 6.51 (t, J = 5.1 Hz, 1H), 6.28 (s, 1H), 3.43 (dt, J = 5.1, 6.3 Hz, 2H), 3.27 (m, 4H), 2.42 (t, J = 6.3 Hz, 2H), 2.18 (s, 6H), 1.82 (m, 4H), 1.69 (m, 4H);
MS (ESI, Pos. 20 V) : 313 (M + H)⁺, 157 (M + 2H)²⁺;
TLC : Rf 0.19 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 19-04

20

N¹-(2-azepan-1-ylquinolin-4-yl)-N²,N²-dimethylethane-1,2-diamine

- [2133] NMR (DMSO-d₆) : δ 7.80 (d, J = 8.1 Hz, 1H), 7.33 (m, 2H), 6.99 (m, 1H), 6.46 (t, J = 5.1 Hz, 1H), 5.81 (s, 1H), 3.69 (t, J = 6.0 Hz, 4H), 3.31 (m, 2H), 2.53 (t, J = 6.9 Hz, 2H), 2.21 (s, 6H), 1.74 (m, 4H), 1.47 (m, 4H);
25 MS (ESI, Pos. 20 V) : 313 (M + H)⁺, 241, 157 (M + 2H)²⁺;
TLC : Rf 0.22 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 19-05

30 N¹-(1-azepan-1-ylisoquinolin-3-yl)-N²,N²-dimethylglycinamide

- [2134] NMR (DMSO-d₆) : δ 9.33 (s, 1H), 7.98 (d, J = 8.7 Hz, 1H), 7.81 (s, 1H), 7.70 (d, J = 8.4 Hz, 1H), 7.54 (dd, J = 8.4, 6.6 Hz, 1H), 7.33 (dd, J = 8.7, 6.6 Hz, 1H), 3.65 (m, 4H), 3.10 (s, 2H), 2.30 (s, 6H), 1.84 (m, 4H), 1.64 (m, 4H);
MS (ESI, Pos. 20 V) : 327 (M + H)⁺, 242, 164;
35 TLC : Rf 0.48 (CHCl₃ : MeOH = 10 : 1).

Example 19-06

40 N¹-(1-azepan-1-ylisoquinolin-3-yl)-N²,N²-dimethylethane-1,2-diamine

- [2135] NMR (DMSO-d₆) : δ 7.78 (d, J = 8.4 Hz, 1H), 7.37 (d, J = 7.8 Hz, 1H), 7.29 (dd, J = 7.8, 6.6 Hz, 1H), 6.95 (dd, J = 8.4, 6.6 Hz, 1H), 6.00 (s, 1H), 5.64 (t, J = 5.4 Hz, 1H), 3.95 (m, 4H), 3.25 (dt, J = 5.4, 6.3 Hz, 2H), 2.42 (t, J = 6.3 Hz, 2H), 2.17 (s, 6H), 1.82 (m, 4H), 1.63 (m, 4H);
MS (ESI, Pos. 20 V) : 313 (M + H)⁺, 157 (M + 2H)²⁺;
45 HPLC condition : A; HPLC retention time (min) : 2.85;
TLC : Rf 0.48 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 19-07

50 1-(4-azepan-1-yl-6-chloro-1,3,5-triazin-2-yl)azepane

- [2136] NMR (DMSO-d₆) : δ 1.46 (m, 8H), 1.65 (m, 8H), 3.61 (q, J = 5.95 Hz, 8H);
MS (ESI, Pos. 20 V) : 312, 310 (M + H)⁺;
TLC : Rf 0.77 (Hexane : AcOEt = 3 : 1).

55

Example 19-08

N-(4-azepan-1-yl-1,3,5-triazin-2-yl)ethane-1,2-diamine dihydrochloride

- 5 **[2137]** NMR (DMSO- d_6) : δ 1.49 (m, 4H), 1.73 (m, 4H), 3.00 (m, 2H), 3.63 (q, J = 6.00 Hz, 2H), 3.77 (m, 4H), 8.26 (m, 2H), 8.41 (s, 1H), 8.69 (m, 1H);
 MS (ESI, Pos, 20 V) : 237 (M + H)⁺;
 TLC : Rf 0.17 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

10 Example 19-09

N-(4-azepan-1-yl-6-chloro-1,3,5-triazin-2-yl)ethane-1,2-diamine dihydrochloride

- 15 **[2138]** NMR (CD₃OD) : δ 1.60 (m, 4H), 1.80 (m, 4H), 3.21 (t, J = 5.77 Hz, 2H), 3.79 (m, 6H); MS (ESI, Pos, 20 V) : 273, 271 (M + H)⁺;
 TLC : Rf 0.23 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 19-10

20 N-(4-azepan-1-yl-6-methoxy-1,3,5-triazin-2-yl)ethane-1,2-diamine dihydrochloride

- [2139]** NMR (CD₃OD) : δ 1.62 (m, 4H), 1.85 (m, 4H), 3.22 (t, J = 6.00 Hz, 2H), 3.77 (t, J = 6.00 Hz, 2H), 3.87 (m, 4H), 4.11 (s, 3H);
 MS (ESI, Pos, 20 V) : 267 (M + H)⁺;
 25 TLC : Rf 0.27 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

Example 19-11

N-[5-(azepan-1-ylmethyl)pyrimidin-2-yl]ethane-1,2-diamine trihydrochloride

- 30 **[2140]** NMR (DMSO- d_6) : δ 1.59 (m, 4H), 1.81 (m, 4H), 2.98 (m, 4H), 3.27 (m, 2H), 3.57 (m, 2H), 4.16 (d, J = 5.10 Hz, 2H), 7.86 (m, 1H), 8.22 (m, 3H), 8.61 (s, 2H), 11.22 (m, 1H);
 MS(LC-MS, APCI, Pos. 20 V) : 250 (M + H)⁺, 151;
 35 TLC : Rf 0.46 (CHCl₃ : MeOH : NH₄OH = 80 : 20 : 4).

Example 19-12

N¹-(4-cycloheptylquinazolin-2-yl)-N²,N²-dimethylethane-1,2-diamine

- 40 **[2141]** NMR (DMSO- d_6) : δ 7.97 (d, J = 8.1 Hz, 1H), 7.61 (m, 1H), 7.42 (d, J = 6.9 Hz, 1H), 7.17 (m, 1H), 6.85 (m, 1H), 3.62 (m, 1H), 3.43 (dt, J = 6.0, 6.6 Hz, 2H), 2.44 (t, J = 6.6 Hz, 2H), 2.18 (s, 6H), 2.00-1.57 (m, 12H);
 MS (ESI, Pos. 20 V) : 313 (M + H)⁺, 157 (M + 2H)²⁺, 102;
 TLC : Rf 0.46 (CHCl₃ : MeOH : NH₄OH = 80 : 10 : 1).

45 Biological Examples

- [2142]** An effectiveness of the compounds of the present invention represented by formulae (I) and (II) was confirmed, for example, by the following experiments. The entire procedure utilized a standard method together with a cell exhibiting a high expression prepared in accordance with a basic gene engineering technology. A measurement method of the present invention has improved measurement accuracy and/or measurement sensitivity in order to evaluate the compounds of the present invention. The experimental method is detailed below.

- [2143]** As described above, in order to screen for a compound which inhibits the binding of HIV with CXCR4 or CCR5 which is a receptor on a CD4 positive cell, an experiment in an assay system employing an HIV virus is a more direct procedure. However, use of an HIV virus in a large scale screening is not practical because of its difficulty in handling. On the other hand, since both of a T cell-directing (X4) HIV-1 and SDF-1 bind to CXCR4, there may be a certain common profile in the CXCR4 binding site on both of HIV and SDF-1 as well as in SDF-1 and HIV binding sites on the CXCR4. Accordingly, an assay system employing an SDF-1 which is an intrinsic ligand of CXCR4 instead of HIV can be utilized in order to identify a compound which inhibits the adsorption of an HIV virus onto a cell which is an action

mechanism different from that of an existing AIDS drug (reverse transferase inhibitor or protease inhibitor).

[2144] Typically, as an assay for screening for a compound which inhibits the binding between SDF-1 and CXCR4, a system measuring the binding between an I-labeled SDF-1 and a human T cell line known to express CXCR4 can be employed. Since both of a macrophage (R5) HIV and RANTES, MIP-1 α , MIP-1 β bind to CCR5, a similar understanding is possible.

Experimental methods

Experiment Example 1: Inhibition of human SDF-1 with CEM cell

[2145] In a binding buffer solution (HEPES containing BSA), a human T cell line CEM cell was mixed with a test compound and ^{125}I -SDF-1 (NEN) and incubated for 60 minutes at 40°C. The reacted CEM cell was filtered rapidly through a GF/B membrane filter plate (Packard) to effect adsorption, followed by washing three times with PBS, drying and addition of Microscint+20 (Packard). The radioactivity binding to the CEM cell is measured using Top Count (Packard) and a % inhibition by a test compound was calculated according to the equation shown below.

$$\% \text{ Inhibition} = (\text{Et}-\text{Ea})/(\text{Et}-\text{Ec}) \times 100$$

Et: Radioactivity in the absence of a test compound

Ec: Radioactivity in the presence of non-radioactive SDF-1 (Pepro Tech) as a test compound at a level 1000 times higher than ^{125}I -SDF-1

Ea: Radioactivity in the presence of a test compound

[2146] All compounds of the present invention described in Examples exhibited inhibitions of 50% or higher at 10 μM . For example, the IC_{50} values of the compounds of Example 1(41) and Example 4 are 0.20 μM and 0.15 μM , respectively.

Formulation example 1

[2147] Each of the following components was mixed by a standard method and punched out to give 10000 tablets each containing 10 mg of active ingredient.

- 2-(2-dimethylaminoethylamino)-4-(perhydroazepin-1-yl)pyrimidine 5.0 g
- carcium carboxymethyl cellulose (disintegrant) 20.0 g
- magnesium stearate (lubricant) 10.0 g
- microcrystalline cellulose 870 g

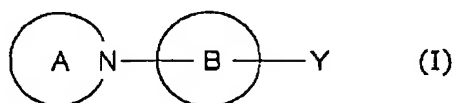
Formulation example 2

[2148] Each of the following components was mixed by a standard method and filtered through a dustproofing filter, and then 5 ml aliquots were charged into ampoules, which were autoclaved to thereby obtain 10,000 ampoules each containing 20 mg of the active ingredient.

- 2-(2-dimethylaminoethylamino)-4-(perhydroazepin-1-yl)pyrimidine 200 g
- mannitol 2 kg
- distilled water 50 L

Claims

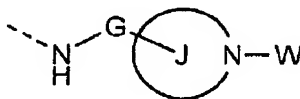
1. A compound represented by formula (I):



wherein ring A represents a nitrogen-containing heterocyclic group which may have a substituent(s); ring B represents a homocyclic group which may have a substituent(s) or a heterocyclic group which may have a substituent(s); and Y represents a hydrocarbon group which may have a substituent(s), a heterocyclic group which may have a substituent(s), an amino group which may be protected, a hydroxyl group which may be protected or a mercapto group which may be protected,

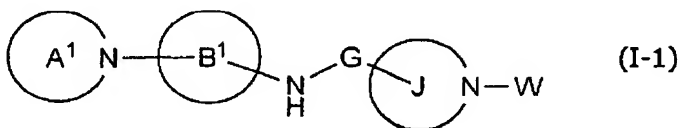
a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof

2. The compound according to claim 1, wherein ring A is a 5- to 10-membered nitrogen-containing heterocyclic group which may have a substituent(s).
3. The compound according to claim 1, wherein ring B is a nitrogen-containing heterocyclic group which may have a substituent(s).
4. The compound according to claim 1, wherein Y is



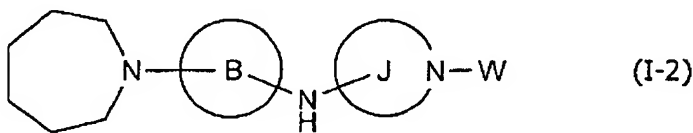
wherein G represents a bond or a spacer containing 1 to 3 atoms as a main chain; ring J represents a 4- to 7-membered nitrogen-containing heterocyclic group which may have a substituent(s); and W represents hydrogen, a hydrocarbon group which may have a substituent(s) or a heterocyclic group which may have a substituent(s).

5. The compound according to claim 1, which is represented by formula (I-1):



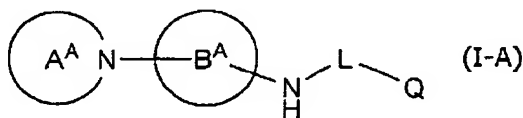
wherein ring A¹ represents a 5- to 10-membered nitrogen-containing saturated heterocyclic group which may have a substituent(s), or a 5- to 10-membered nitrogen-containing heterocyclic group which has one double bond and which may have a substituent(s); ring B¹ represents a 6- to 11-membered nitrogen-containing monocyclic or bicyclic heterocyclic group which may have a substituent(s); and other symbols have the same meanings as those described in claim 4.

6. The compound according to claim 1, which is represented by formula (I-2):



wherein all symbols have the same meanings as those described in claim 1 or 4.

7. A compound represented by formula (I-A):



wherein ring A^A represents a 4- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which is saturated or has one double bond and which contains at least one nitrogen atom and may further contain 1 to 3

nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom;

ring BA represents BA¹ or BA²;

BA¹ represents:

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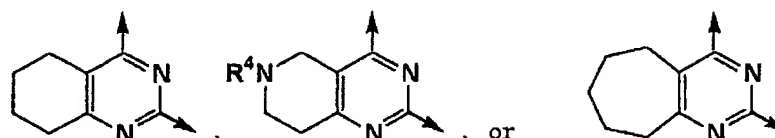
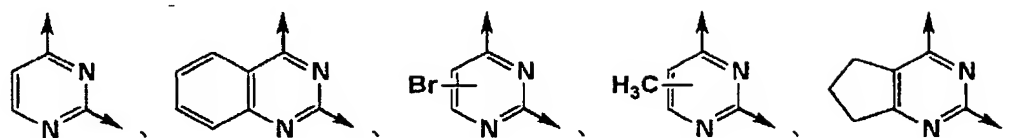
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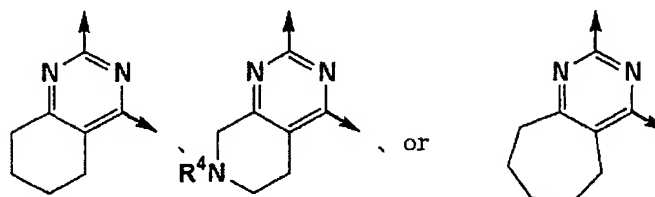
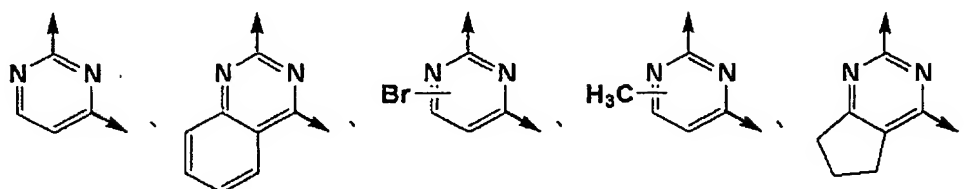
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BA² represents:



R⁴ represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with 1 to 5 of R¹⁰, (iii) a C3-8 carbocyclic group which may be substituted with 1 to 5 of R³, (iv) a 5- to 15-membered heterocyclic group which contains 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom and which may be substituted with 1 to 5 of R³, (v) COR⁵ wherein R⁵ represents C1-15 alkyl, C2-15 alkenyl, C2-15 alkynyl or phenyl, or (vi) COOR⁶ wherein R⁶ represents C1-15 alkyl, C2-15 alkenyl, C2-15 alkynyl or phenyl; the upward arrow represents a binding position to ring A^A; and the right-downward arrow represents a binding position to the nitrogen atom bound to L;

L represents (1) a bond, (2) C1-8 alkylene, C2-8 alkenylene or C2-8 alkynylene, wherein the alkylene, alkenylene and alkynylene each may be substituted with 1 to 5 of R¹⁰, or (3) a C3-8 carbocyclic group which may be substituted with R³;

Q represents (1) NR¹R² wherein R¹ and R² each independently represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with 1 to 5 of R¹⁰, (iii) a C3-8 carbocyclic group which may be substituted with 1 to 5 of R³, or (iv) a 5- to 15-membered heterocyclic group which contains 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom and which may be substituted 1 to 5 of R³, or (2) ring C; ring C represents a 4- to 15-membered heterocyclic group which contains at least one nitrogen atom and may further contain 1 or 2 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom and which may be substituted with 1 to 5 of R³;

plural R³'s each independently represents (1) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl, wherein the alkyl, alkenyl and alkynyl may be substituted with 1 to 5 of R¹⁰, (2) oxo, or (3) R¹⁰;

plural R^{10} 's each independently represents (1) OR^{11} , (2) $OCOR^{12}$, (3) $OCOOR^{13}$, (4) $NR^{14}R^{15}$, (5) $NR^{16}COR^{12}$, (6) $NR^{16}CONR^{14}R^{15}$, (7) $NR^{16}COOR^{13}$, (8) $COOR^{13}$, (9) COR^{12} , (10) $CONR^{14}R^{15}$, (11) SO_2R^{12} , (12) SOR^{22} , (13) $SO_2NR^{24}R^{25}$, (14) $NR^{16}SO_2R^{12}$, (15) $B(OH)_2$, (16) SR^{11} , (17) halogen, (18) nitro, (19) cyano, or (20) ring D;

R^{11} represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl, wherein the alkyl, alkenyl and alkynyl may be substituted with 1 to 5 of halogen, $NR^{14}R^{15}$, OR^{21} , SR^{21} , $COOR^{13}$, or ring D, or (iii) ring D;

R^{12} , R^{13} , R^{14} , R^{15} and R^{16} each independently represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with ring D, or (iii) ring D;

ring D represents a C3-15 monocyclic, bicyclic or tricyclic carbocyclic group, or a 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains 1 to 4 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom; and

ring D may be substituted with 1 to 5 of the groups selected from the following (1) to (22):

(1) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl, wherein the alkyl, alkenyl or alkynyl may be substituted with 1 to 5 of OR^{21} , $OCOR^{22}$, $OCOOR^{23}$, $NR^{24}R^{25}$, $NR^{26}COR^{22}$, $NR^{26}CONR^{24}R^{25}$, $NR^{26}COOR^{23}$, $COOR^{23}$, COR^{22} , $CONR^{24}R^{25}$, SO_2R^{22} , SOR^{22} , $SO_2NR^{24}R^{25}$, $NR^{26}SO_2R^{22}$, $B(OH)_2$, SR^{21} , halogen, nitro or cyano, (2) oxo, (3) OR^{21} , (4) $OCOR^{22}$, (5) $OCOOR^{23}$, (6) $NR^{24}R^{25}$, (7) $NR^{26}COR^{22}$, (8) $NR^{26}CONR^{24}R^{25}$, (9) $NR^{26}COOR^{23}$, (10) $COOR^{23}$, (11) COR^{22} , (12) $CONR^{24}R^{25}$, (13) SO_2R^{22} , (14) SOR^{22} , (15) $SO_2NR^{24}R^{25}$, (16) $NR^{26}SO_2R^{22}$, (17) $B(OH)_2$, (18) SR^{21} , (19) halogen, (20) nitro, (21) cyano or (22) ring E;

R^{21} represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with COR^{22} , $NR^{24}R^{25}$ or ring E, or (iii) ring E;

R^{22} , R^{23} , R^{24} , R^{25} and R^{26} each independently represents (i) hydrogen, (ii) C1-15 alkyl, C2-15 alkenyl or C2-15 alkynyl which may be substituted with ring E, or (iii) ring E;

ring E represents a C3-15 monocyclic, bicyclic or tricyclic carbocyclic group, or a 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains 1 to 4 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom, and

ring E may be substituted with 1 to 5 of (i) C1-15 alkyl which may be substituted with phenyl, (ii) halogen, (iii) phenyl, (iv) C1-15 alkoxy, (v) hydroxyl, (vi) amino, (vii) mono(C1-8 alkyl)amino, or (viii) di(C1-8 alkyl)amino;

ring A^A may be substituted with 1-5 of R^a ;

ring B^A may be substituted with 1-5 of R^b ;

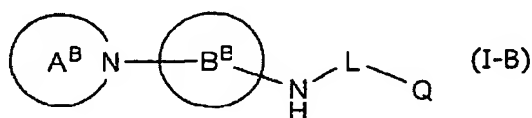
R^a and R^b each independently represents a group which has the same meaning as the group represented by R^3 ; and

wherein the following compounds (1) to (6) are excluded:

- (1) N-[4-(4-morpholinyl)-2-quinazolinyl]-1,2-ethanediamine dihydrochloride,
- (2) N,N-dimethyl-N'-[2-(4-phenyl-1-piperidinyl)-4-pyrimidinyl]-1,2-ethylenediamine,
- (3) N-[(3,4-dihydro-2H-1-benzopyran-2-yl)methyl]-N'-[2-(1-piperidinyl)-4-pyrimidinyl]-1,3-propanediamine,
- (4) N-[(3,4-dihydro-2H-1-benzopyrane-2-yl)methyl]-N'-[2-(1-piperidinyl)-4-pyrimidinyl]-1,3-propanediamine oxalate,
- (5) N,N-diethyl-N'-[2-(1-pyrrolidinyl)-4-quinazolinyl]-1,2-ethanediamine, and
- (6) N,N-diethyl-N'-[2-(1-pyrrolidinyl)-4-quinazolinyl]-1,2-ethanediamine dihydrochloride,

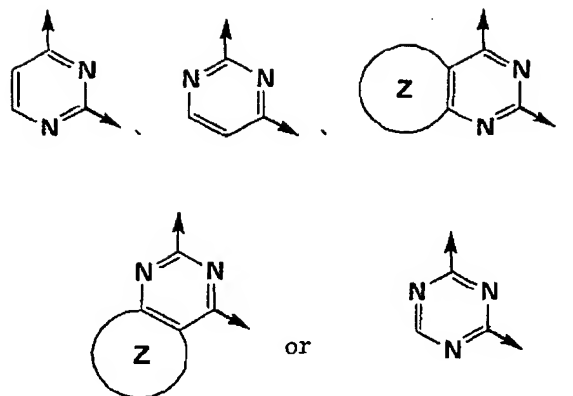
a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof

8. A compound represented by formula (I-B):



wherein ring A^B represents a 7- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which is saturated or contains one double bond and which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom;

ring B^B represents:



wherein ring Z represents a C5-10 monocyclic or bicyclic carbocyclic group, or a 5- to 10-membered monocyclic or bicyclic heterocyclic group which may contain 1 or 2 nitrogen atoms, one oxygen atom and/or one sulfur atom; the upward arrow represents a binding position to ring A^B; and the right-downward arrow represents a binding position to the nitrogen atom bound to L;

ring A^B may be substituted with 1 to 5 of R^a; ring B^B may be substituted with 1 to 5 of R^b; and R^a, R^b and other symbols have the same meanings as those described in claim 7, and

wherein the following compounds (1) to (7) are excluded:

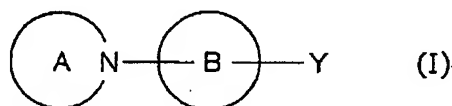
- (1) N-[4-(hexahydro-1H-azepin-1-yl)thieno[3,2-d]pyrimidin-2-yl]-1,4-butanediamine dihydrochloride,
- (2) 7-[4-[4,6-bis(hexahydro-1H-azepin-1-yl)-1,3,5-triazin-2-yl]amino-2H-1,2,3-triazol-2-yl]-3-phenyl-2H-1-benzopyran-2-one,
- (3) 4-ethoxy-6-(hexahydro-1H-azepin-1-yl)-N-[3-(4-morpholinyl)propyl]-1,3,5-triazin-2-amine,
- (4) 4-(hexahydro-1H-azepin-1-yl)-6-methyl-N-[3-(4-morpholinyl)propyl]-1,3,5-triazin-2-amine,
- (5) 4-chloro-6-(hexahydro-1H-azepin-1-yl)-N-[2-(4-morpholinyl)ethyl]-1,3,5-triazin-2-amine,
- (6) 4-(hexahydro-1H-azepin-1-yl)-6-methoxy-N-[3-(4-morpholinyl)propyl]-1,3,5-triazin-2-amine, and
- (7) N-[4-(hexahydro-1H-azepin-1-yl)thieno[3,2-d]pyrimidin-2-yl]-1,4-butanediamine, or

a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof

9. The compound according to any one of claims 1, 7 and 8, which is

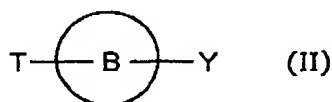
- (1) N-(4-azepan-1-yl)pyrimidin-2-yl)ethane-1,2-diamine,
- (2) N¹-(4-azepan-1-yl)pyrimidin-2-yl)-N²,N²-dimethylethane-1,2-diamine,
- (3) 4-azepan-1-yl-N-((3S)-1-cyclohexylpyrrolidin-3-yl)pyrimidin-2-amine,
- (4) 4-azepan-1-yl-N-((3S)-1-benzylpyrrolidin-3-yl)pyrimidin-2-amine,
- (5) 4-azepan-1-yl-N-((3S)-1-(2-ethylbutyl)piperidin-3-yl)pyrimidin-2-amine,
- (6) 4-azepan-1-yl-N-[(3S)-1-cyclohexylpiperidin-3-yl]pyrimidin-2-amine,
- (7) 4-azepan-1-yl-N-[(3S)-1-tetrahydro-2H-pyran-4-ylpiperidin-3-yl]pyrimidin-2-amine,
- (8) 4-(3S)-3-[(4-azepan-1-yl)pyrimidin-2-yl]amino]piperidin-1-ylcyclohexanol, or
- (9) (3S)-N-(4-azepan-1-yl)pyrimidin-2-yl)-1'-(cyclohexylcarbonyl)-1,4'-bipiperidin-3-amine.

10. A pharmaceutical composition, which comprises a compound represented by formula (I):

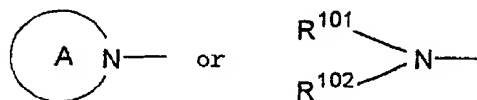


wherein all symbols have the same meanings as those described in claim 1, a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof.

11. The pharmaceutical composition according to claim 10, which is a CXCR4 regulating agent.
12. The pharmaceutical composition according to claim 11, wherein the CXCR4 regulating agent is a CXCR4 antagonist.
13. The pharmaceutical composition according to claim 12, which is a preventive and/or therapeutic agent for human immunodeficiency virus infection.
14. The pharmaceutical composition according to claim 13, which is a preventive and/or therapeutic agent for acquired immunodeficiency syndrome.
15. The pharmaceutical composition according to claim 10, which is an agent for regeneration medicine.
16. The pharmaceutical composition according to claim 15, wherein the agent for regeneration medicine is an agent for transplantation medicine.
17. A CXCR4 regulating agent, which comprises a compound represented by formula (II):



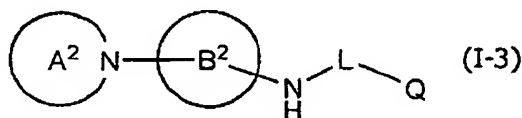
wherein T represents



wherein R^{101} and R^{102} each independently represents hydrogen or a hydrocarbon group which may have a substituent(s); ring A has the same meaning as that described in claim 1; and other symbols have the same meanings as those described in claim 1,

a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, as an active ingredient.

18. The agent according to claim 17, wherein the CXCR4 regulating agent is a CXCR4 antagonist.
19. A CXCR4 regulating agent, which comprises a compound represented by formula (I-3):

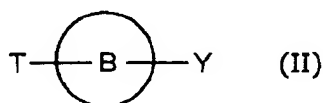


wherein ring A^2 represents a 4- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom; ring B^2 represents a 5- to 15-membered monocyclic, bicyclic or tricyclic heterocyclic group which contains at least one nitrogen atom and may further contain 1 to 3 nitrogen atoms, 1 or 2 oxygen atoms and/or one sulfur atom; ring A^2 may be substituted with 1 to 5 of R^a ; ring B^2 may be substituted with 1 to 5 of R^b ; and R^a , R^b and other symbols have the same meanings as those described in claim 7,

a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, as an active ingredient.

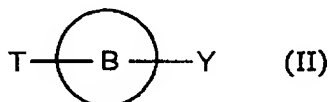
20. The CXCR4 regulating agent according to claim 19, which is a CXCR4 antagonist.
21. A CXCR4 regulating agent, which comprises the compound represented by formula (I-A) according to claim 7, a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, as an active ingredient.

22. The CXCR4 regulating agent according to claim 21, which is a CXCR4 antagonist.
23. A CXCR4 regulating agent, which comprises the compound represented by formula (I-B) according to claim 8, a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, as an active ingredient.
24. The CXCR4 regulating agent according to claim 23, which is a CXCR4 antagonist.
25. The CXCR4 regulating agent according to claim 17 or 19, which is a preventive and/or therapeutic agent for inflammatory/immune diseases, allergic diseases, infectious diseases, HIV infection or diseases accompanied therewith, psychoneurotic diseases, cerebral diseases, cardiovascular diseases, metabolic diseases and cancerous diseases.
26. The CXCR4 regulating agent according to claim 25, which is a preventive and/or therapeutic agent for HIV infection or diseases accompanied therewith.
27. The CXCR4 regulating agent according to claim 17 or 19, which is useful for regeneration medicine.
28. A medicament which comprises the compound according to any one of claims 1, 7, 8 and 17, a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof, in combination with one or at least two of a reverse transferase inhibitor, a protease inhibitor, a CCR2 antagonist, a CCR3 antagonist, a CCR4 antagonist, a CCR5 antagonist, a fusion inhibitor, an antibody against a surface antigen of HIV-1, and a vaccine of HIV-1.
29. The medicament according to claim 28, wherein the reverse transferase inhibitor is one or at least two selected from zidovudine, didanosine, zalcitabine, stavudine, lamivudine, abacavir, adefovir, dipivoxil, emtricitabine, tenofovir, nevirapine, nevirapine, efavirenz and capravirine.
30. The medicament according to claim 28, wherein the protease inhibitor is one or at least two selected from indinavir, ritonavir, nelfinavir, saquinavir, amprenavir, lopinavir and lopinavir.
31. A method for antagonizing CXCR4 in a mammal, which comprises administering to a mammal an effective amount of a compound represented by formula (II):



wherein all symbols have the same meanings as those described in claim 1 or 17, a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof,

32. Use of a compound represented by formula (II):



wherein all symbols have the same meanings as described in claim 1 or 17, a salt thereof, an N-oxide thereof, a solvate thereof, or a prodrug thereof for the manufacture of a CXCR4 antagonist.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/15718

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁷ C07D213/74, 401/14, 403/04, 403/14, 471/04, 401/12, 401/04, 403/12, 405/14, 409/14, 417/14, 405/12, 413/04, 413/12, 215/42, 493/04, 493/10, 495/04, 473/16, 251/50, According to International Patent Classification (IPC) or to both national classification and IPC																							
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) Int.Cl. ⁷ C07D213/74, 401/14, 403/04, 403/14, 471/04, 401/12, 401/04, 403/12, 405/14, 409/14, 417/14, 405/12, 413/04, 413/12, 215/42, 493/04, 493/10, 495/04, 473/16, 251/50, Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) REGISTRY (STN), CAPLUS (STN)																							
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>WO 00/56729 A1 (ANORMED INC.),</td> <td>1-8, 10-30, 32</td> </tr> <tr> <td>Y</td> <td>28 September, 2000 (28.09.00),</td> <td>28-30</td> </tr> <tr> <td>A</td> <td>All references; in particular, description, pages 4 to 5, 7 to 9, 17 to 18 & EP 1163238 A1</td> <td>9</td> </tr> <tr> <td>X</td> <td>WO 02/22599 A2 (ANORMED INC.),</td> <td>1-8, 10-30, 32</td> </tr> <tr> <td>Y</td> <td>21 March, 2002 (21.03.02),</td> <td>28-30</td> </tr> <tr> <td>A</td> <td>All references; in particular, description, pages 6 to 9 & EP 1317451 A1</td> <td>9</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	WO 00/56729 A1 (ANORMED INC.),	1-8, 10-30, 32	Y	28 September, 2000 (28.09.00),	28-30	A	All references; in particular, description, pages 4 to 5, 7 to 9, 17 to 18 & EP 1163238 A1	9	X	WO 02/22599 A2 (ANORMED INC.),	1-8, 10-30, 32	Y	21 March, 2002 (21.03.02),	28-30	A	All references; in particular, description, pages 6 to 9 & EP 1317451 A1	9
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.																							
* Special categories of cited documents: "A" document defining the general state of the art which is not "E" considered to be of particular relevance earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family																							
Date of the actual completion of the international search 27 January, 2004 (27.01.04)		Date of mailing of the international search report 17 February, 2004 (17.02.04)																					
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer																					
Facsimile No.		Telephone No.																					

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/15718

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 01/040227 A1 (Ono Pharmaceutical Co., Ltd.), 07 June, 2001 (07.06.01), All references; in particular, pages 184 to 185, 304, 311 to 312, 320, 328, 336, 343, 344 to 345, 351 to 352, 359 to 362, 378 & EP 1236726 A1	1-3,10-18,27 28-30
X Y	JP 2002-348288 A (Ono Pharmaceutical Co., Ltd.), 04 December, 2002 (04.12.02), All references; in particular, page 33, compound 2(33); page 35, compound 2(54); page 36, compound 2(62) (Family: none)	1-3,10-18,27 28-30
X	WO 2002/45652 A2 (MERCK & CO.), 13 June, 2002 (13.06.02), All references; in particular, description, page 105, compound 25-4 & US 2002/137755 A1 & EP 1341540 A2	1-8,10
X	GUPTA, C.M.; BHADURI, A.P.; KHANNA, N.M.; Drugs acting on the central nervous system. Syntesis of substituted quinazolinones and quinazolines and triazepino- and triazocinoquinazolinones., Journal of medicinal Chemistry, 1968, Vol.11, No.2, pages 392 to 395; in particular, page 393, compound 23	1-8,10,25,32
X	GE 1113918 A (FARBENFABRIKEN BAYER AG.), 15 May, 1968 (15.05.68), In particular, page 5, compound k (Family: none)	1-8
P,X	WO 2003/062236 A1 (WARNER-LAMBERT CO.), 31 July, 2003 (31.07.03), In particular, description, pages 44 to 45; page 83, example 78 (Family: none)	1-8,10-27,32

Form PCT/ISA/210 (continuation of second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/15718

Box I Observations where certain claims were found unsearchable (Continuation of Item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1.
- ☒
- Claims Nos.: 31

because they relate to subject matter not required to be searched by this Authority, namely:

It pertains to methods for treatment of the human body by therapy that are specified as a subject matter which this International Searching Authority is not required, under the provisions of Article 17(2)(a)(i) of the PCT and Rule 39.1(iv) of the Regulations under the PCT, to search.

- 2.
- ☐
- Claims Nos.:

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

- 3.
- ☐
- Claims Nos.:

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

The general formula of the compounds as set forth in claim 1 has no definite fundamental skeleton but is expressed as a whole in variable groups including a large number of alternatives. The structural feature common to compounds represented by this general formula exclusively resides in having a cyclic structure directly attached to the N atom in an N-containing heterocycle group. As reported in WO 01/040227 A1, however, compounds having a cyclic structure directly attached to the N atom in an N-containing heterocycle have been publicly known. It is also publicly known that these compounds have an antagonism to a chemokine receptor. Considering contribution over the prior art, therefore, the above-described structural feature cannot (continued to extra sheet)

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐

The additional search fees were accompanied by the applicant's protest.

☐

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/15718

Continuation of A. CLASSIFICATION OF SUBJECT MATTER
(International Patent Classification (IPC))

Int.Cl⁷ 239/42, A61K31/55, 31/506, 31/551, 31/4725, 31/517, 31/553,
31/4709, 31/444, 31/519, 31/506, A61P3/00, 9/00, 25/00, 29/00,
31/00, 31/18, 35/00, 37/00, 37/08, 43/00

(According to International Patent Classification (IPC) or to both national
classification and IPC)

Continuation of B. FIELDS SEARCHED

Minimum Documentation Searched (International Patent Classification (IPC))

Int.Cl⁷ 239/42, A61K31/55, 31/506, 31/551, 31/4725, 31/517, 31/553,
31/4709, 31/444, 31/519, 31/506, A61P3/00, 9/00, 25/00, 29/00,
31/00, 31/18, 35/00, 37/00, 37/08, 43/00

Minimum documentation searched (classification system followed by
classification symbols)

C. Continuation of Box No. II

be considered as a special technical feature. Since there is no other
technical feature common to the compounds as set forth in claim 1, the
inventions according to claim 1 cannot be considered as being so linked
as to form a single general inventive concept.

Similarly, the inventions as set forth in claims 2 to 30 and 32 have
no special technical feature in common and, therefore, cannot be considered
as a group of inventions so linked as to form a single general inventive
concept.

D. <Search on prior art document>

The general formula of the compounds as set forth in claim 1 has no
definite fundamental skeleton but is expressed as a whole in variable
groups including a large number of alternatives. Thus, it includes a
great number of compounds. Even though the disclosure about them in the
description is taken into consideration, it cannot be considered that
the inventions as set forth in the claim comply with the requirements
in accordance with PCT Articles 5 and 6 to such an extent that no meaningful
international search can be carried out on prior art documents. Such
being the case, prior art documents were searched in the international
search report exclusively on the compounds represented by the general
formula as set forth in claim 6, the compound as set forth in claim 9
and nitrogen-containing heterocyclic compounds having an inhibitory
effect on a chemokine receptor, by reference to the statement in the
description too.